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Oki Data CONFIDENTIAL

MICROLINE 380 PRINTER
Maintenance Manual

(OEL)

[Rev. 2]

Related drawings

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41735301TR	MICROLINE380(OEL) RSPL

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PREFACE

This maintenance manual describes field maintenance of the Microline 380 printer and options for maintenance personnel.

For performance specifications and operating procedures, refer to the "User's Manual".

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1. CONFIGURATION

1.1. Standard Printer Configuration

The standard configuration of the ML380 is as follows.

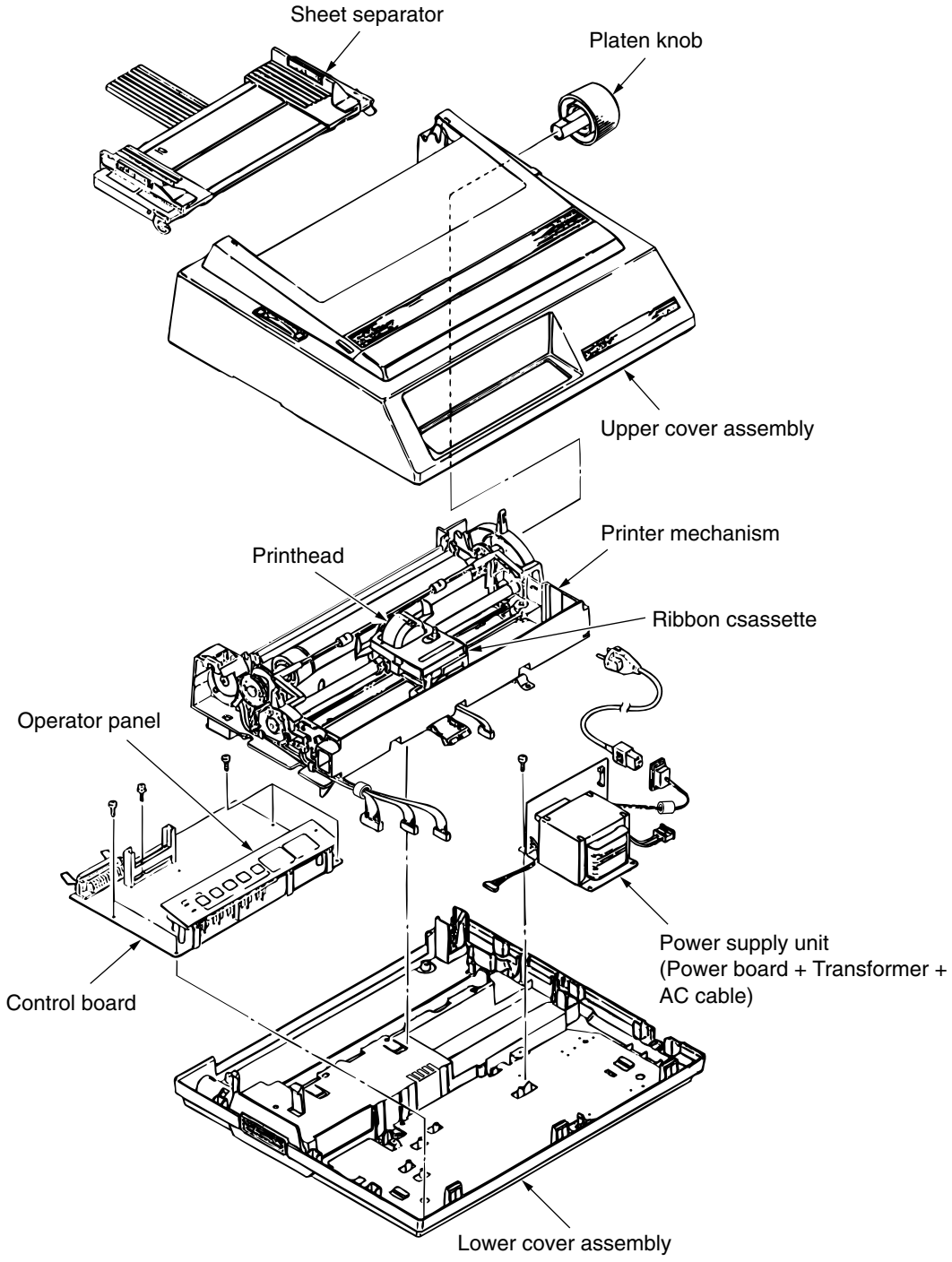
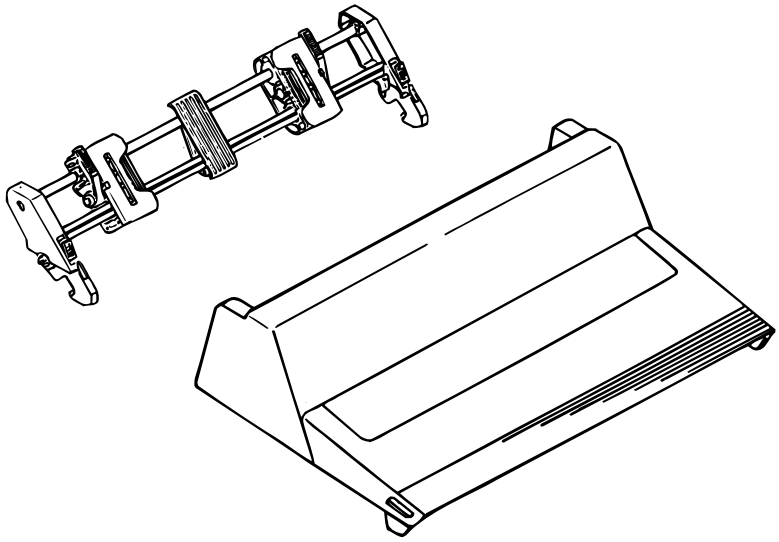


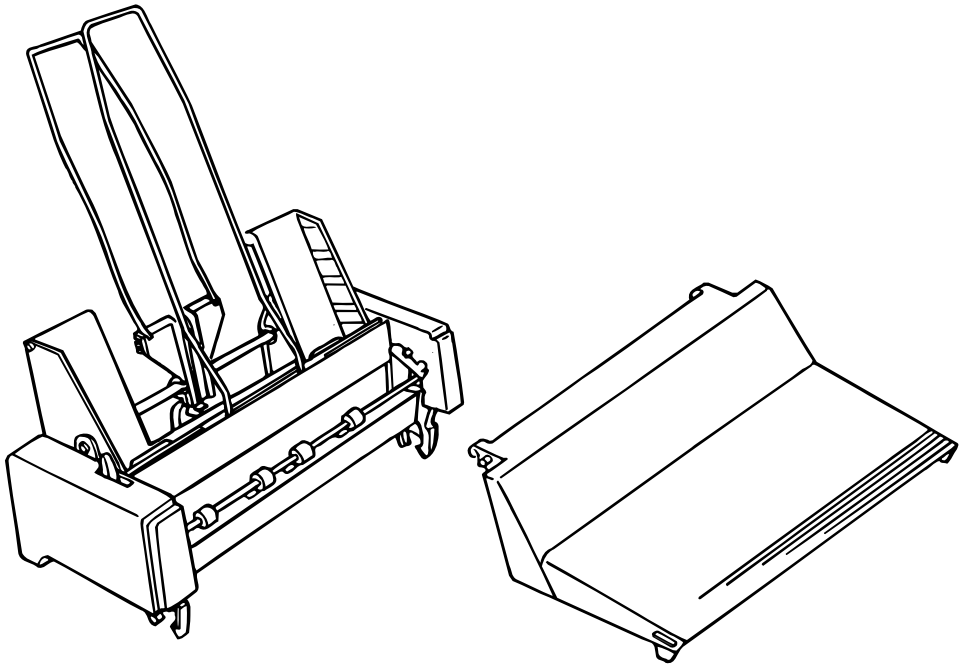
Figure 1-1 Printer Configuration

1.2 Options

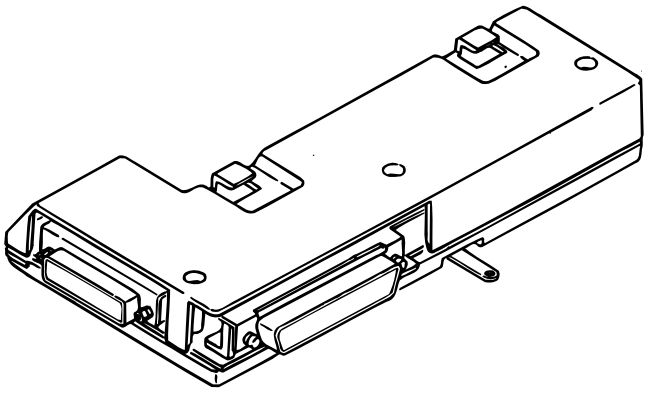
(1) Tractor feed unit with the acoustic cover



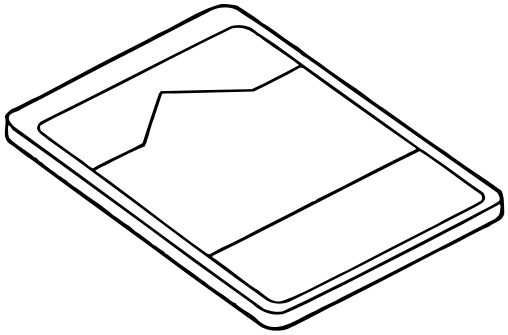
(2) Cut-sheet feeder unit with access cover



(3) RS-232C serial interface module



(4) Font memory card



1.3 Specifications

1.3.1 Print specifications

(1) Print method : Impact dot matrix

(2) Number of dot wires : 24

(3) Dot wire diameter : 0.0079 inch (0.2mm)

(4) Print direction : Bi-directional, short-line-seeking printing
Unidirectional printing specifiable

(5) Print speed :

Print mode	Character pitch				
	10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
LQ	53 CPS	63.6 CPS	79.5 CPS	90.9 CPS	106 CPS
Utility	160 CPS	192 CPS	120 CPS	137.1 CPS	160 CPS

(6) Character sets

Standard ASCII

EPSON Character Set

IBM Character Set I & II

IBM Proprinter Compatible Character Set

Foreign Character Substitution

Line Graphics

(7) Character Pitches

The following character pitches are selectable through the operator panel* or with control codes:

5CPI 0.2inch (5.08mm)

6CPI 0.167inch (4.23mm)

8.5CPI 0.117inch (2.96mm)

* 10CPI 0.1inch (2.54mm)

* 12CPI 0.083inch (2.12mm)

* 15CPI 0.067inch (1.69mm)

* 17.1CPI 0.058inch (1.48mm)

* 20CPI 0.05inch (1.27mm)

1.3.2 Paper specifications

(1) Cut-sheet paper

The standard size : 8-1/2 inches (wide) × 11 inches (long) for the U.S.

A4 size : 210 mm (wide) × 297 mm (long) for Europe

Weight : 14 to 22 lbs (53 to 83 g/m^2)

Multiple-part paper cannot be used.

(2) Sprocket paper

The tractor feed unit can handle sprocket paper of the following widths:

3 to 10 inches (76.2 to 254 mm)

One-part paper

Ream weight : 14 to 22 lb (53 to 83 /m^2)

Multiple-part paper : 0.1 inch (0.25 mm) or less total thickness

	Ream weight	Number of sheets
Carbon-lined paper	9 to 11 lbs	Up to 3
Pressure-sensitive paper	(35 to 40 g/m^2)	Including original
Interleaf paper (paper)	10 to 12 lbs (38 to 45 g/m^2)	Up to 3 Including original
(carbon)	9 lbs (35 g/m^2)	

Multiple-part paper should be fastened by spot-pasting or crimping on both sides, and should be free of wrinkles.

1.3.3 Physical specifications

(1) Outside dimensions

15.67 inches (398mm) (w) × 4.72 inches (120mm) (H) × 13.58 inches (345mm) (D)

These dimensions do not include the platen knob, acoustic cover and paper separator.

(2) Weight

17 lb (7.7 kg)

1.3.4 Power requirements

(1) Input power

Single-phase AC

Voltage, Frequency : One of the following as specified:

2.220/240 VAC ± 10%, 50/60Hz ± 2% (Selected by short plug)

(2) Power consumption

Operating : 90 VA In local self test

Idle : 30 VA Stand by

1.3.5 Environmental conditions

(1) Ambient temperature and relative humidity

	Operating	Non-operating	Storage	Unit
Temperature	41 to 95	14 to 109.4	-40 to 158	˚F
	(5 to 35)	(-10 to 43)	(-40 to 70)	(˚C)
Relative Humidity	20 to 80	5 to 95	5 to 95	% RH

The printer must be packed during storage.

Avoid condensation at all times.

(2) Vibration

Operation : 0.3G (5 to 150 Hz) or less (except when the unit is at resonant frequency)

Non-operating : 1G (5 to 150 Hz) or less (except when the unit is at resonant frequency)

(3) Impact

Non-operating : 3G or less

1.3.6 Noise

57 dBA

1.3.7 Agency approvals

CE : EN55022 Class B, EN55024

2. INSTALLATION PROCEDURE

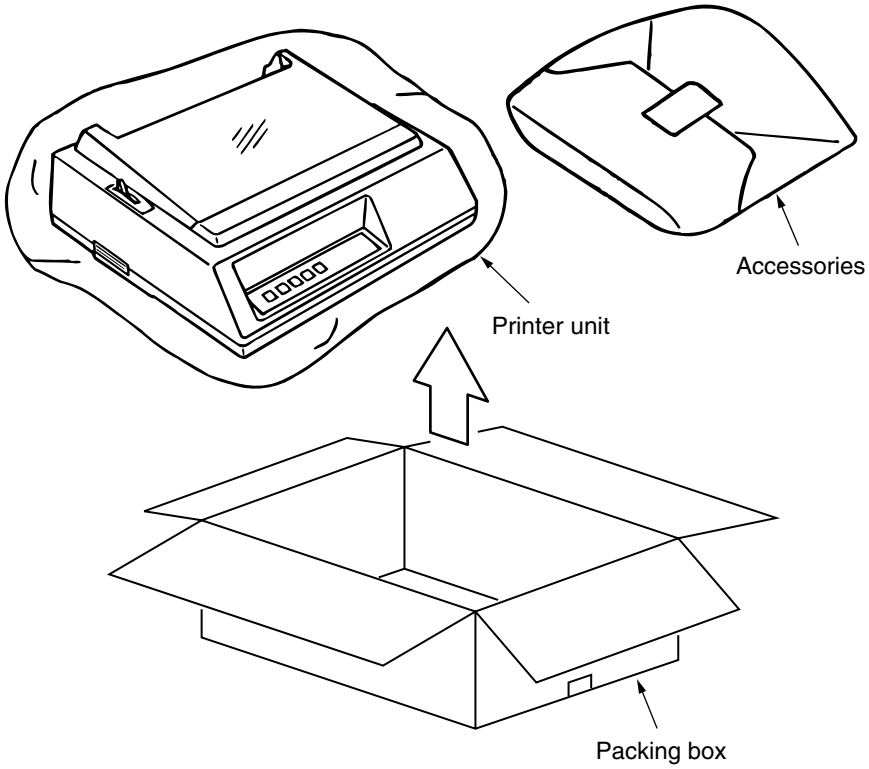
2.1 Unpacking

2.1.1 Unpacking the printer

(1) Open the packing box.

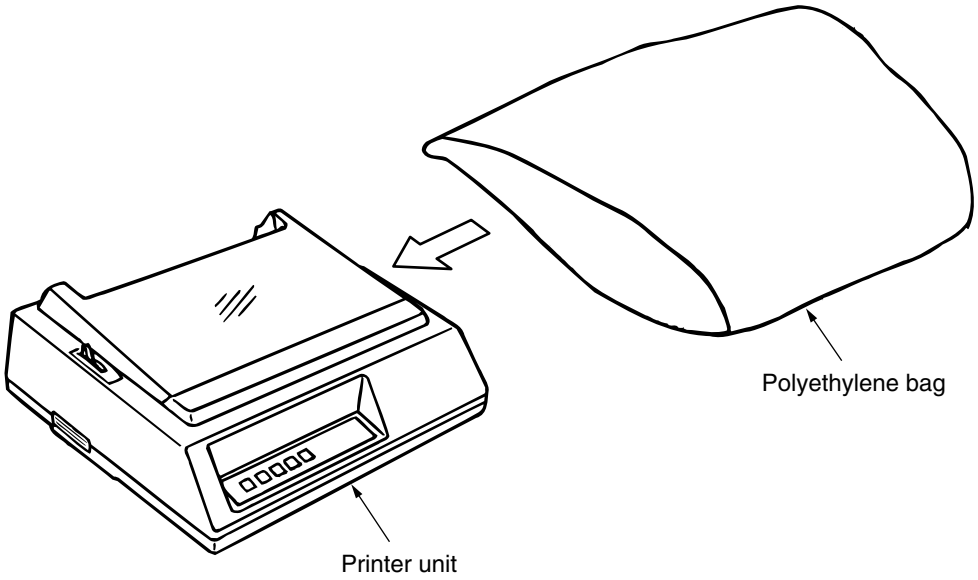
(2) Take out the printer unit.

(3) Take out the accessories.



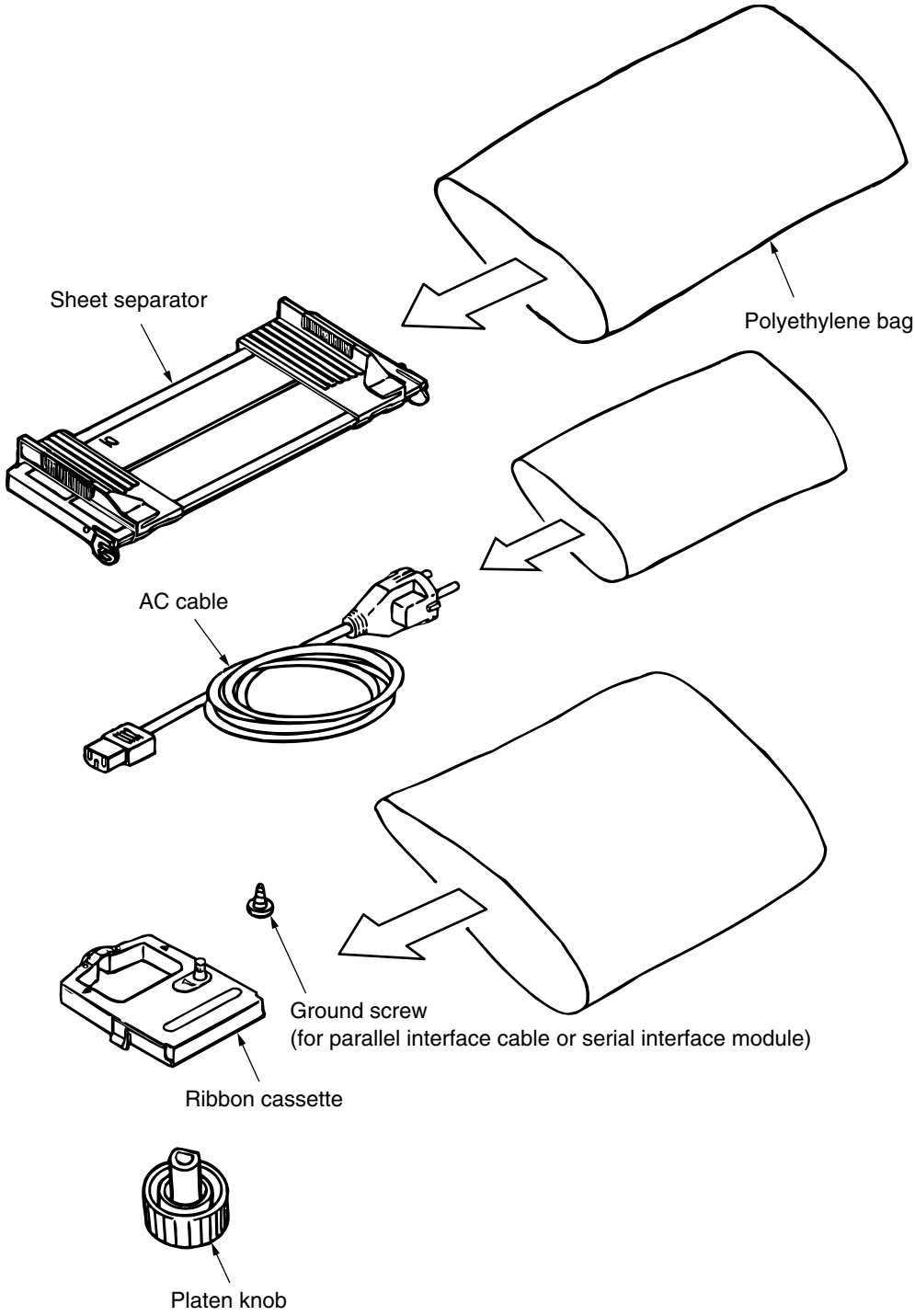
2.1.2 Unpacking the printer unit

Remove the printer unit from the polyethylene bag.



2.1.3 Unpacking the accessories

Remove the sheet separator, platen knob, ground screw, and ribbon cassette from the polyethylene bag.



2.2 Installation (Refer to the User's Manual for Details.)

2.2.1 Precautions for installation

Pay attention to the following when installing the printer:

(1) Do not install the printer in the following places:

(a) Any place exposed to direct sunlight

(b) Any place with great fluctuations in temperature occur

(c) Any place exposed to outdoor wind

(d) A dusty place

(e) Near a door

(f) Near an air-conditioner

(g) Any place with heavy vibrations

(2) Do not smoke in the area where the printer is installed.

(3) Adjust the temperature and humidity of the installation site as follows:

Temperature : 41 to 104˚F (5 to 35˚C)

Humidity : 20 to 90% RH

(4) Place the printer and continuous form in the following procedure:

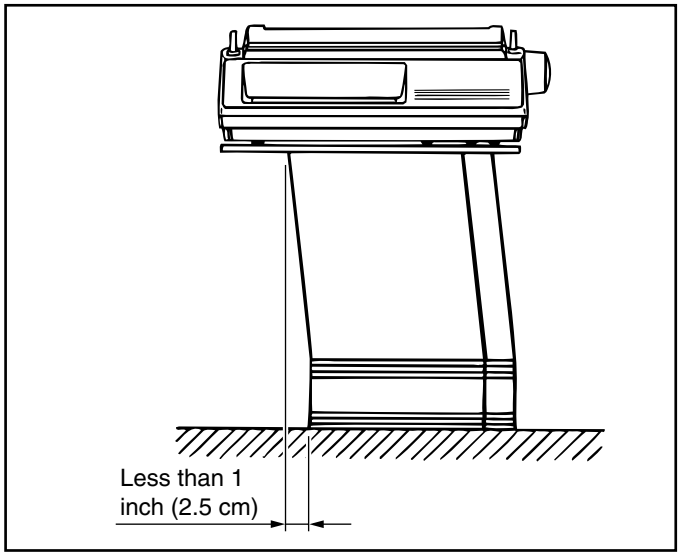
1) The height of the desk for the printer is 28 inches (70 cm) standard.

(Install the printer on a level and flat desk or stand so that its two rubber feet fit flatly on the surface.)

2) Paper positioning

Place forms in parallel with the paper feed path.

The positioning tolerance of the left and right direction should be less than 1 inch (2.5 cm).



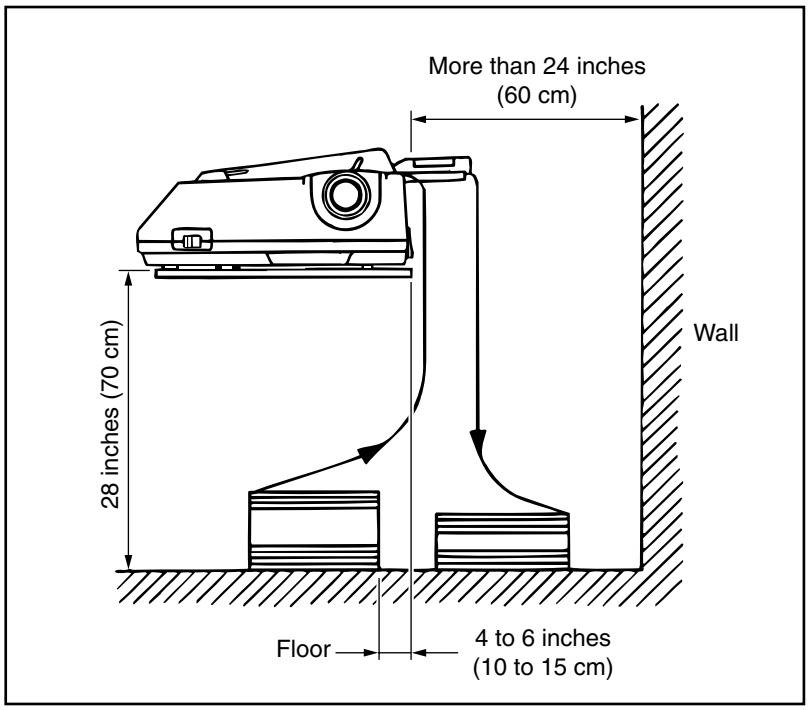
3) Printer rear space requirement

Match the rear part of the printer with the edge of a desk.

Leave a space of more than 24 inches (60 cm) at the rear of the printer to allow sufficient space for paper.

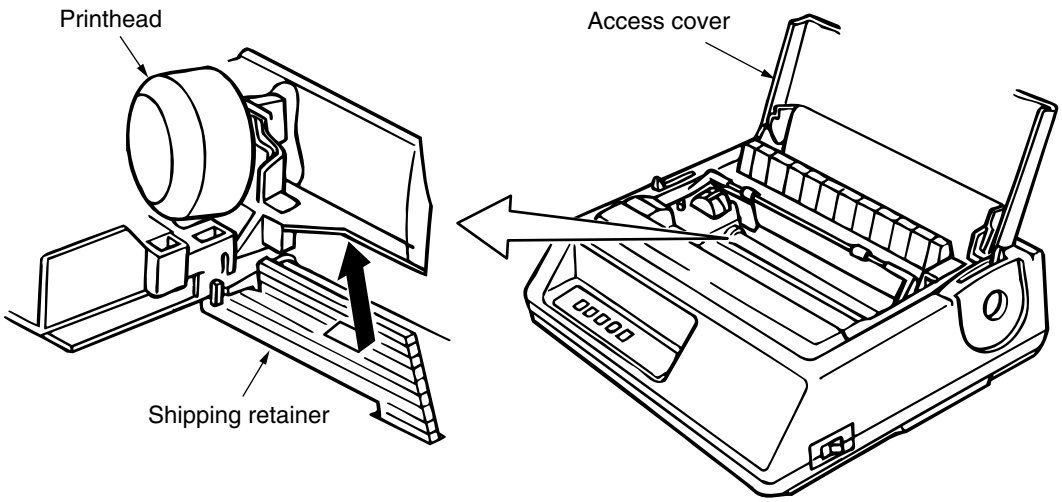
4) To prevent incoming and outgoing forms from interfering with each other, place the forms within 4 to 6 inches (10 to 15 cm) from the edge of a desk.

Paper jamming may occur if forms interfere with each other.



2.2.2 Removing the shipping retainer

Remove the shipping retainer (which secures the printhead from movement during shipping) by opening the access cover, and lifting out the shipping retainer.

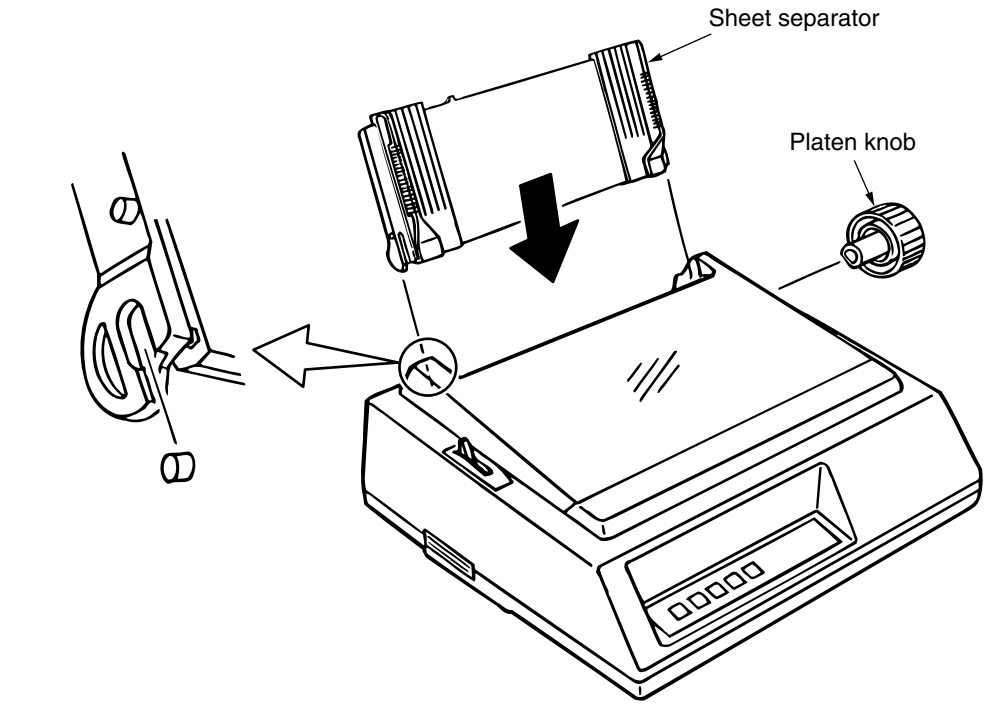


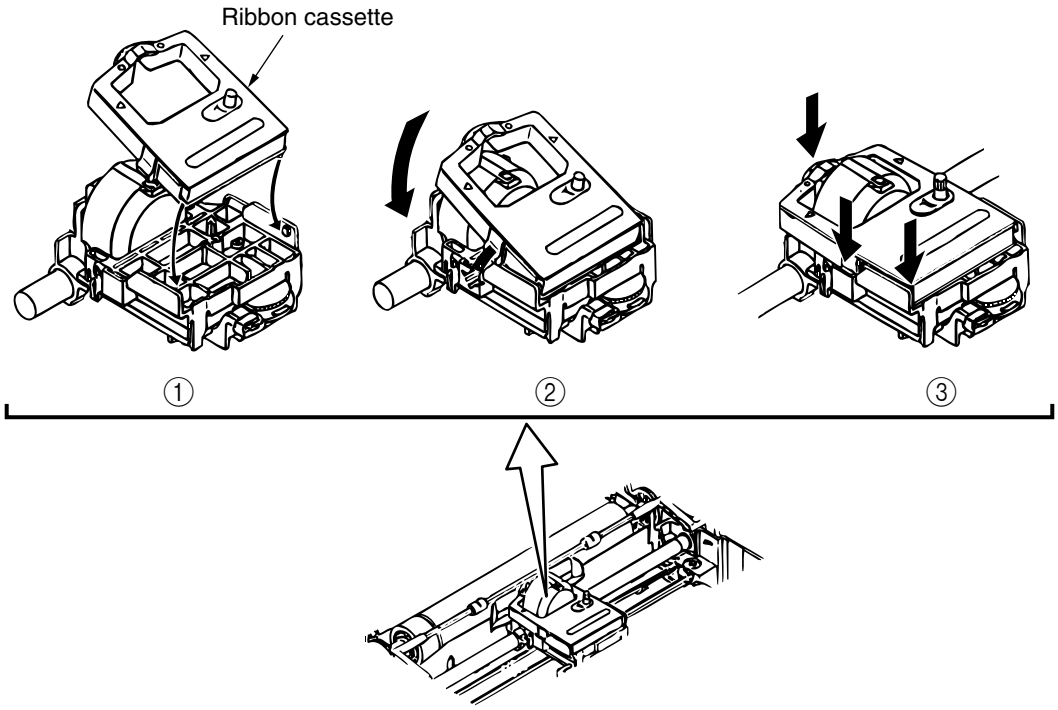
2.2.3 Installing the accessories

(1) Install the sheet separator.

(2) Install the platen knob.

(3) Install the ribbon cassette.



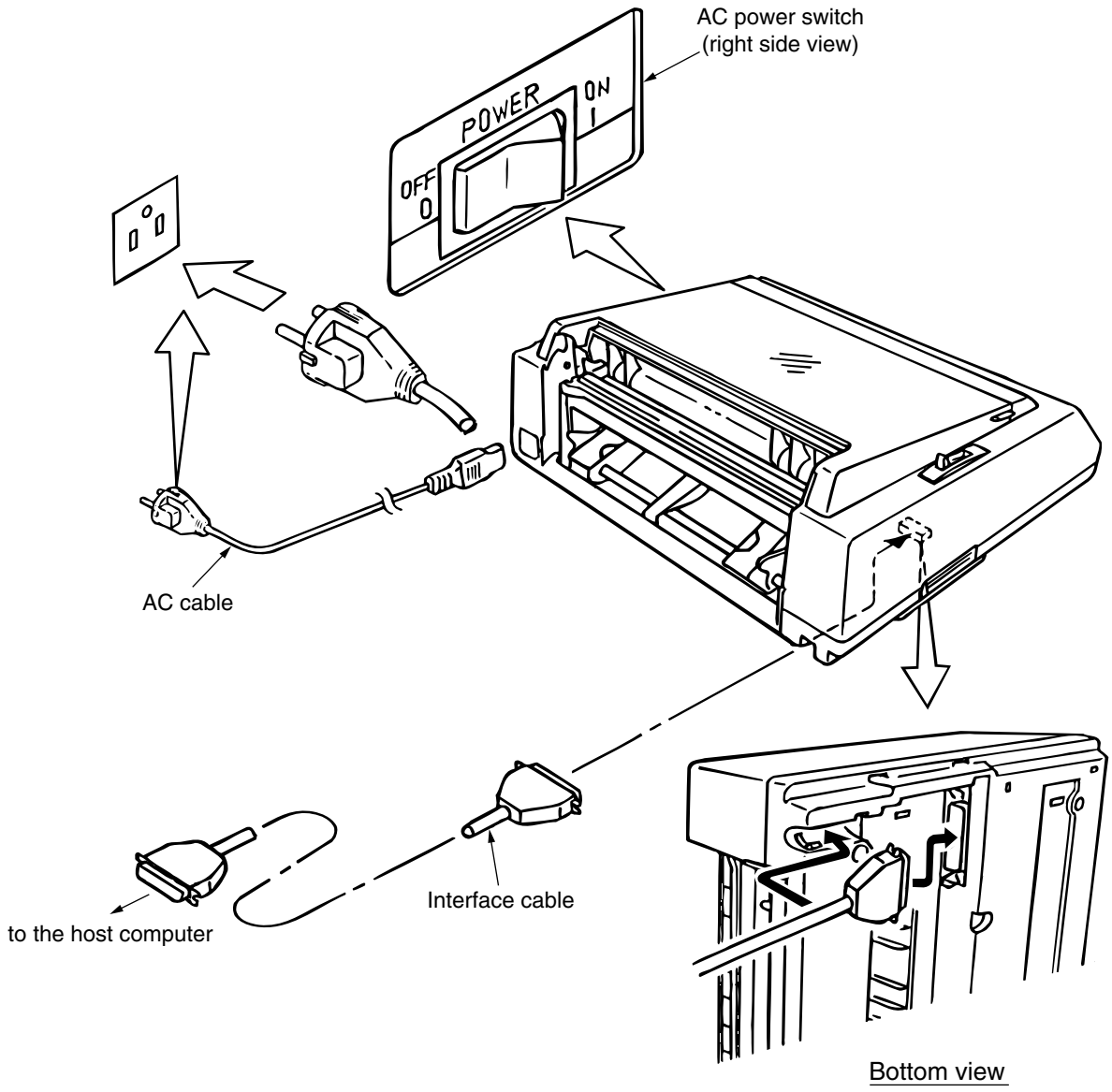


2.2.4 Connecting cables

(1) Connect the interface cable.

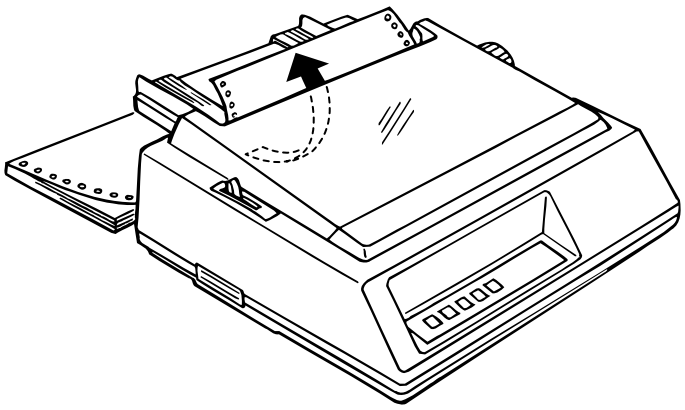
(2) Connect the AC cable.

Make sure that the AC power switch on the right side of the printer is set to OFF side (the side marked with 0).



2.2.5 Installing paper

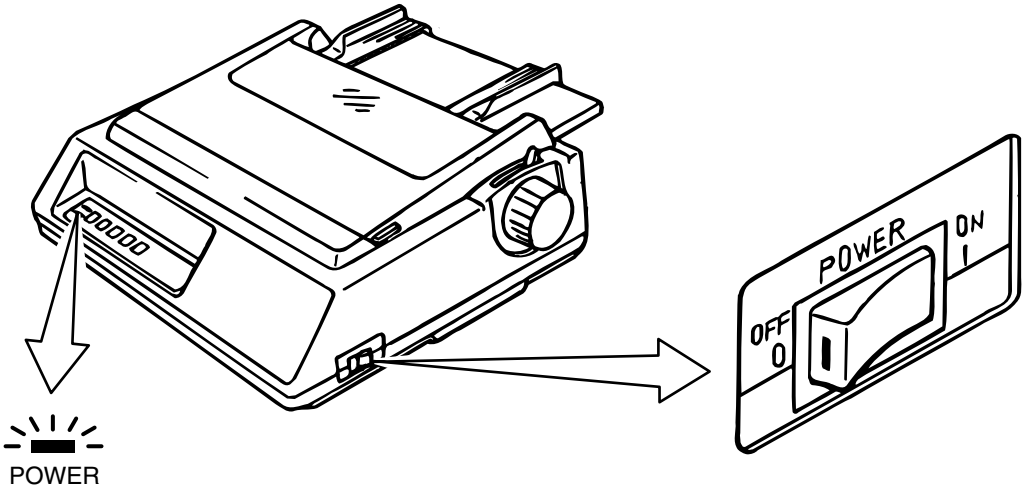
Install continuous form paper to test the printer unit. (Refer to User's Manual for details.)



2.2.6 Powering on

(1) Push the AC “power” switch on the right side of the printer to “ON” (the side marked with 1).

(2) Confirm the “POWER” lamp goes on and the printhead returns to its home position.



2.2.7 Rolling ASCII test pattern

(1) Confirm that the “power” switch is OFF and while pressing the “TOF/PARK” switch, press the “POWER” switch to “ON”.

(2) The rolling ASCII pattern as shown below will be printed.

(3) To finish the test, press the “SELECT” switch.

(4) The “SELECT” lamp will go on, indicating that the printer unit is ready to receive printing data from the host computer.

3. THEORY OF OPERATION

3.1 Electrical Operation

This section describes the electrical operation of the printer circuits.

3.1.1 General

The block diagram of the printer circuit is shown in Figure 3-1.

The control board consists of the microprocessor and its peripheral circuits, the drive circuits, DC voltage supply circuit and interface connector. The switches and LEDs on the operation panel are mounted on this board.

The power to the control board is provided from the power supply unit. The power to the other electrical parts is distributed via the connectors on the control board.

3.1.2 Microprocessor and its peripheral circuits

(1) Microprocessor (Q5 : 83C154-551GS-V1K)

The microprocessor is the nucleus of the control circuit. Its peripheral circuits operate under program control by this microprocessor. The I/O ports of the microprocessor are connected to the address bus, data bus, and control lines. This microprocessor incorporates a 16 KB mask ROM in which part of the control program is stored.

(2) Program ROM (Q2)

The program ROM contains the control program for the printer. The microprocessor operates by execution of this control program.

(3) RAM(Q4)

The RAM stores data such as print data which has been received.

(4) LSI (LC92018B-283) (Q7)

This LSI switches the phase of space motor, and generates the timing of print dots for each print density. The following describes the functions of the LSI.

(a) Space stepping motor control

To obtain the carriage speed instructed by the μCPU, the LSI generates the pulse switch timing and over drive time by the incorporated counter and controls the space stepping motor by 1-2 phase excision.

To control the position of carriage, the LSI generates the space IPT signal for phase switching.

(b) Dot timing generation for wire dot head print

The LSI generates the print dot timing for the print density instructed by the μCPU using the internal counter, and interrupts the μCPU by the print IPT signal.

(c) Parallel interface control

The LSI has an 8-bit general purpose I/O port (IFD1-IFD8), 5-bit interface control I/O port, and 6-bit input port.

Parallel data from the interface connector input by IFD1-IFD8 is latched to the LSI internal register by the strobe signal (STB), and is read in synchronization with the RD signal of the μCPU.

The BUSY, ACK, PE, SELECT, and FAULT signals from the output port for interface control are synchronized with the WR signal of the μCPU, are sent. The interface input signal is connected to the input port, and is read in synchronization with the RD signal.

(d) Address latch

The low order 8-bit address (A0-A7) is latched by address bus (AD0-AD7).

(e) LF motor control port

The phase data and overdrive signal of the LF stepping motor are synchronized with the μCPU signal, and are output.

(f) LED drive general-purpose current output port (7-bit)

Turn on each LED on the operation panel.

(g) General-purpose input port (5-bit)

Used to read each switch on the operation panel.

(5) CGROM (Q3)

The resident character fonts are stored in the character generator.

(6) EEPROM (Q18)

This 256-bit serial data electrically erasable and programmable ROM stores the menu mode data.

(7) LSI (LC92011B-358) (Q6)

This LSI drives the 24-pin printhead and controls the memory.

The following describes the functions of the LSI.

(a) Printhead drive control

Head data at the ODD and EVEN sides prepared by μCPU firmware processing is synchronized with the WR signal of the μCPU, is set to this LSI, and is output from the HD1-HD24 terminal to the hard driver IC. When the head data is output to the HD ON signal head drive control circuit simultaneously, the head is driven.

(b) Head pin counting function

Counts the number of pins to be driven, changes the width of the HD ON signal by firmware processing of the μCPU, and compensates for drive time.

(c) Memory control

Extends the space of memory by switching the memory bank.

(d) Input port (8-bit)

Unused

(e) LED drive general-purpose current output port (1-bit).

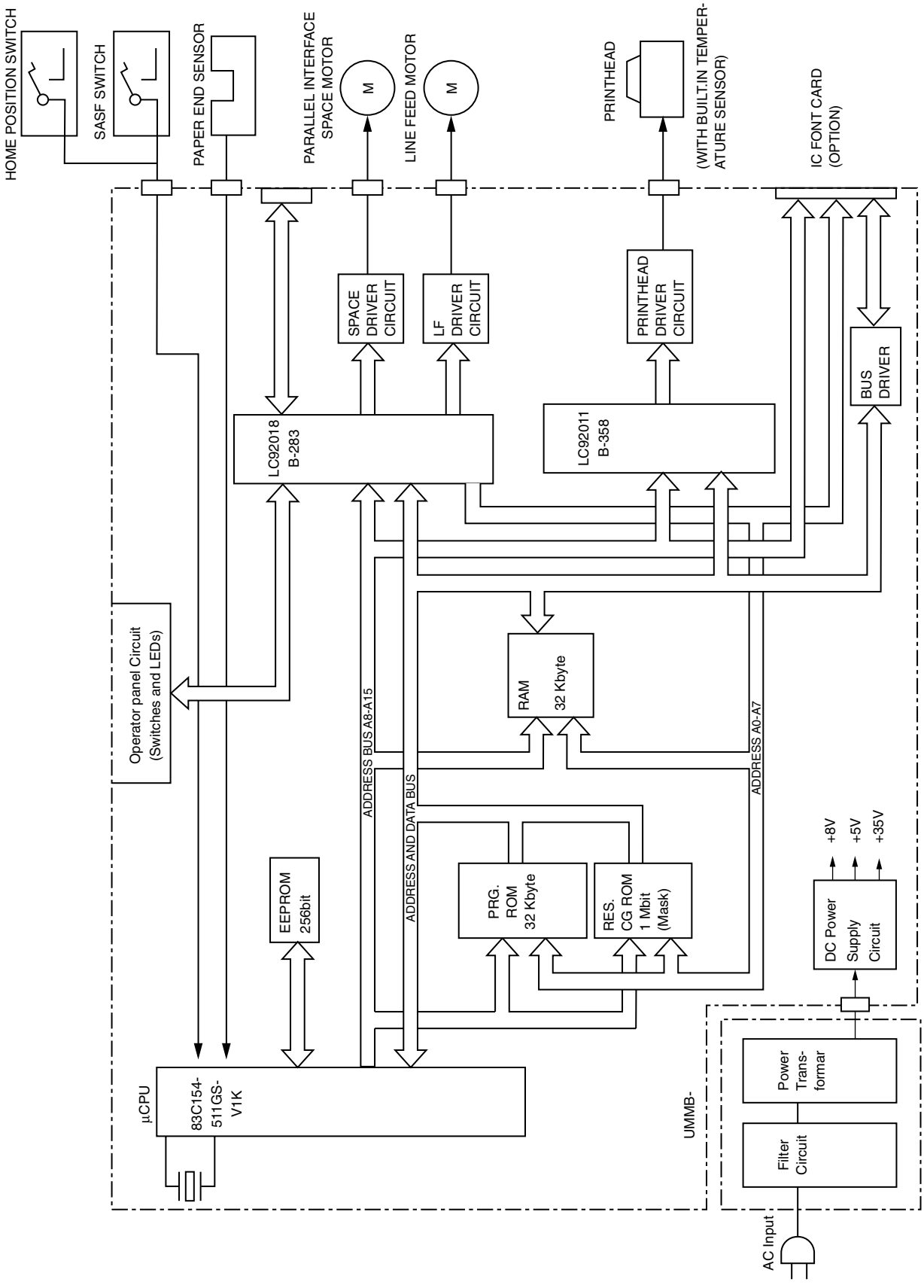


Figure 3-1 Blook diagram

3.1.3 Initialization

The printer is initialized when the power is turned on.

Initialization is started when the RST-P signal is sent from the reset circuit (Q8 pin 1) to Q5, Q6 and Q7.

When reset is completed, ROM program execution starts with mode setting of Q5, Q6 and Q7. Next a memory (ROM and RAM) check is performed, RAM is initialized, and the carriage is homed. The program finally establishes the interface signals (output level of ACK signal, BUSY signal, etc.), lights up the SELECT indicator, and informs the host computer that the printer is ready by the BUSY signal for data reception (in the data reception wait state), thus completing the initialization.

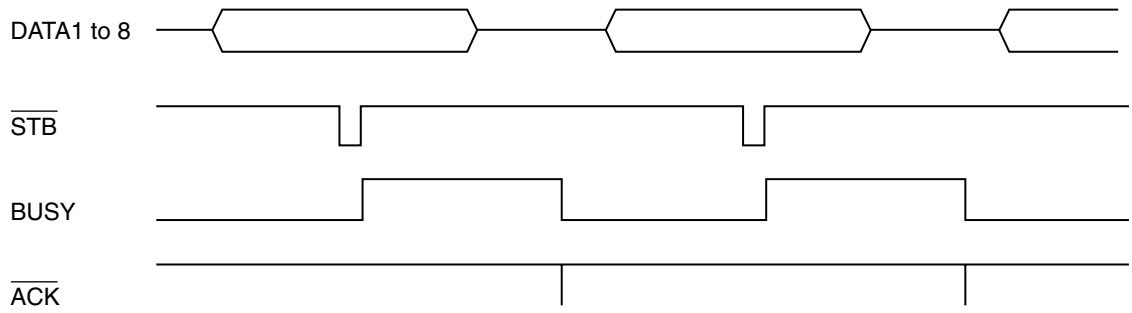
3.1.4 Interface control

(1) Parallel interface

The data from the interface is input through connector (CN1), and the interface LSI (Q7: LC92018B-283) latches this input data in sync with the STB signal.

The BUSY signal is on during processing of this data. When the processing is completed, the BUSY signal is turned off, and an ACK signal is sent to request next data.

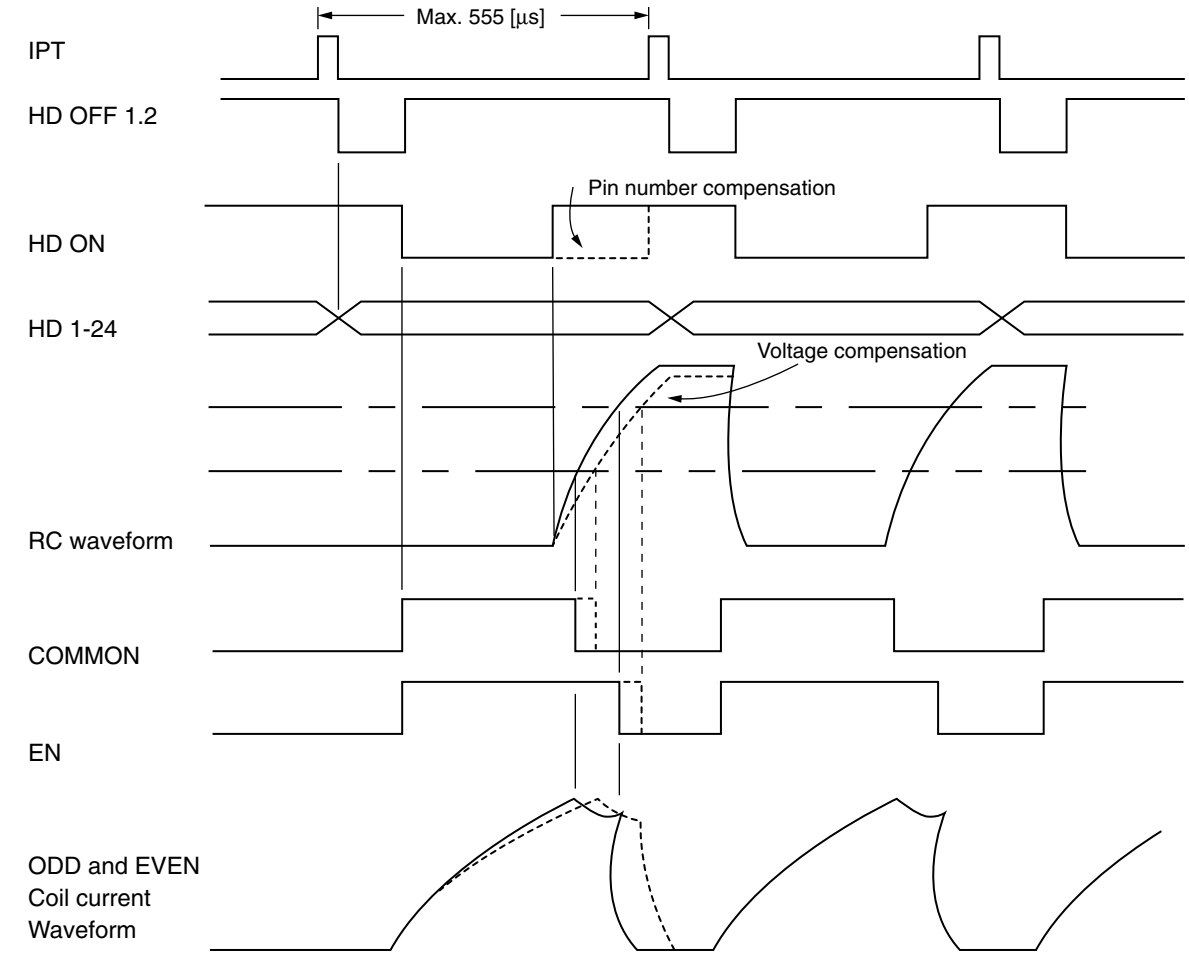
The BUSY signal is also on when data cannot be received (when the receiving buffer is full, etc).



3.1.5 Printhead drive circuit

This circuits is used to drive the head magnets corresponding to HD 1 to 24 (the head pins) by the HD ON signal (even or odd trigger) for printing purposes. When the HD ON signal is at “L” level, the head driving time is determined by the HD ON pulse width and the CR integrating circuit. The pulse width of HD ON varies with the number of pins being driven. The drive time is lengthened if a larger number of pins are to be driven, but shortened if less pins are to be driven. The CR circuit compensates for the fluctuation of drive voltage.

(DRAFT 10CPI)

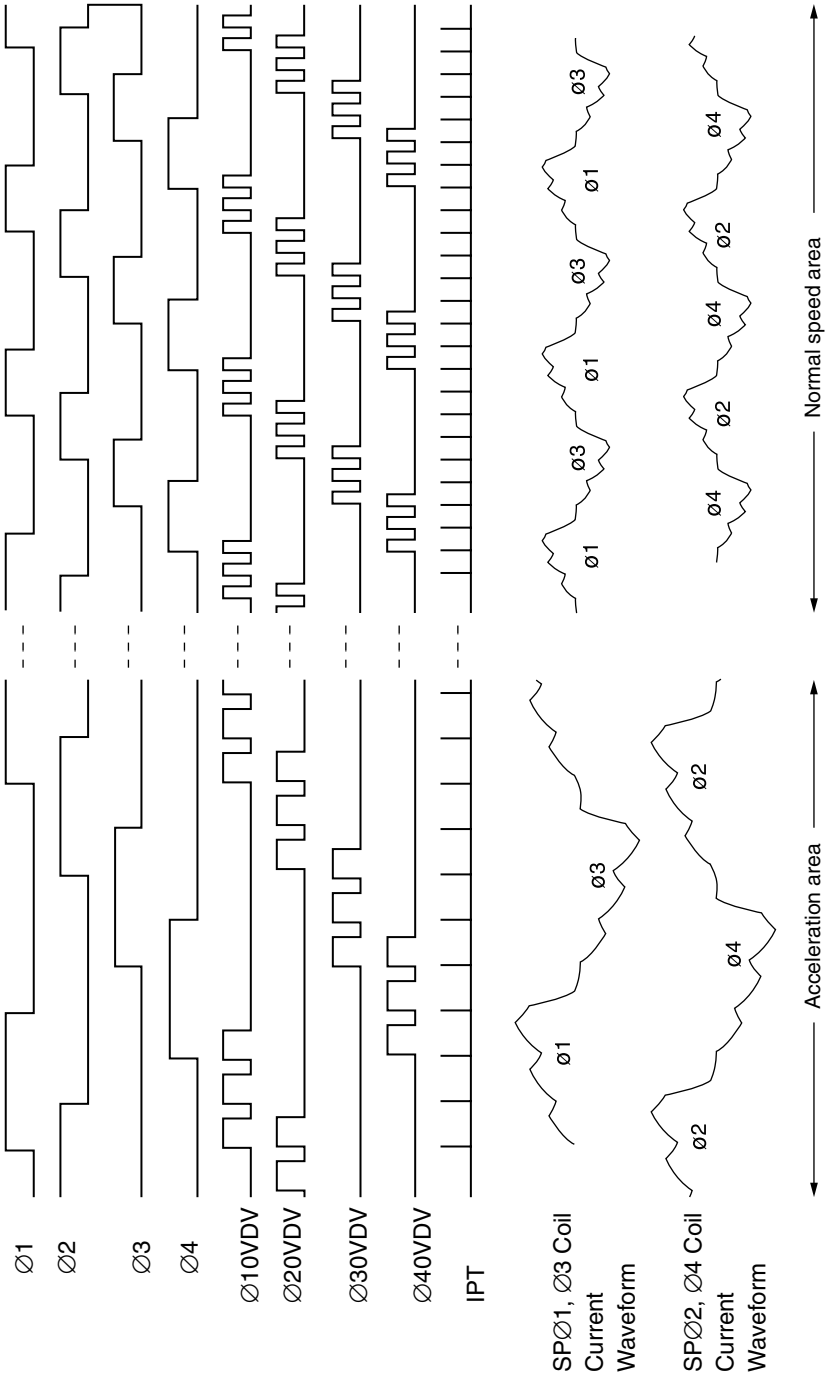


3.1.6 Spacing drive circuit

The space motor is driven for one-two phase bipolar by the two-phase stepping motor.

The phase signals (SPØ1-SPØ4) and overdrive basic pulse (SPØ13OUT, SPØ24OUT) are output from the LSI (Q7).

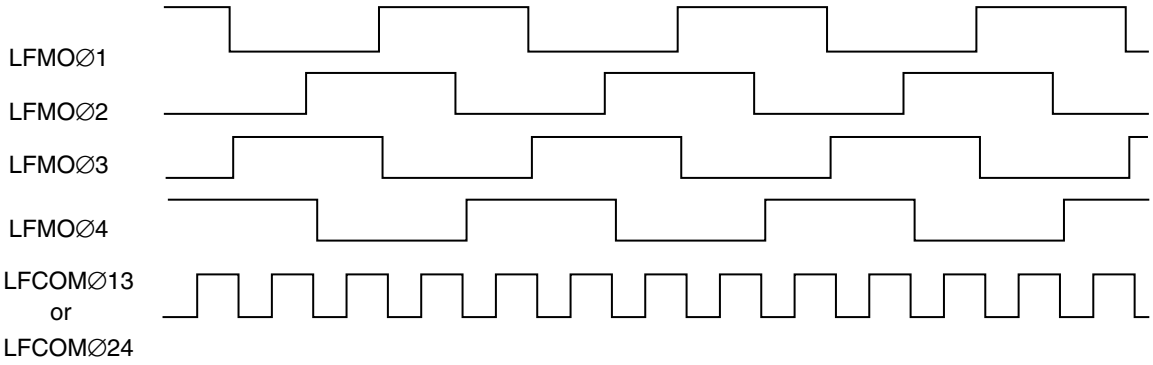
The SPØ13OUT and SPØ24OUT signals are compensated for by the drive voltage compensation circuit, and are input to the LSI again. The space overdrive signals SPOVDVØ1-Ø4 in accordance with the phase signal are output.



3.1.7 Line feed circuit

The line feed motor shaft is held stationary by the +8 V voltage (holding current: approx. 30 mA) while it is at a stopped position.

During line feed operation, the line feed motor is driven by a large current supplied in accordance with LF OVD signal.



3.1.8 Alarm circuits

(1) Fault alarm circuit (in Power Supply Unit)

This is a protective circuit which causes the AC fuse to open when a fault occurs in the printhead drive circuit, LF motor drive circuit, or their peripheral circuits, thus preventing component failure.

For this purpose, this circuit monitors the drive time using the HEAD ALM, LF ALM1 and LF ALM2 signals interlocked with the overdrive signal of each drive circuit. If the drive time of any drive circuit exceeds the specified time, the drive circuit fault alarm circuit sends and ALM signal (high) to turn on the SCR.

This causes the secondary coil (35 V) of the transformer to be short-circuited, causing an overcurrent to flow through the primary coil and making the AC fuse open.

(2) Printhead overheat alarm circuit

In order to protect the printhead coils, this circuit monitors the printhead temperature by using the thermistor which is built into the printhead. This circuit state is sensed for each line print by the μCPU.

If heavy-duty printing is performed continuously for a long time, the printhead temperature increases. When the head temperatures reaches a certain value (about 90˚C~129˚C), a head overheat alarm 1 is detected. When alarm 1 is detected, value of the time for 1 LF is inserted for next line printing.

When the alarm (about 130˚C or more) is detected, the printing operation is halted to wait for the head temperature to decrease. When the head temperature returns below the alarm condition temperature, printing operation is restarted.

Alarm detection is performed as follows:

When the temperature in the printhead increases, the resistance of the thermistor decreases and the voltage at the comparator (Q8) negative input decreases to invert the comparator output, causing the HEAD TEMP signal to be sent to the μCPU.

The reference level of the comparator is changed by the HD THMPCT1 and THMPCT2 signals.

(3) DC voltage low detection circuit

Lowering of drive voltage +35 V is detected during print operation. After voltage lowering is detected, the print data is printed on the way of print on the line by 2 pass and 4 pass head using 12 and 6 pins of 24 pin-head. When voltage lowing is detected in 4 bass print, data is double-spaced for each one column.

When the drive voltage drops, the negative terminal input voltage of the comparator (Q8) decreases, the comparator reverses, and the DC LOW-P signal is turned on.

3.1.9 Paper and detection circuit

Paper end is detected by the photo sensor. For paper and, the PE-N signal goes low, the print operation stops, and the alarm is displayed.

3.1.10 Power supply

The power supply consists of a power transformer, filter board, and DC power supply circuit on the control board.

The input AC voltage is transformed into 8.6 VAC, 46 VAC, by the power transformer. These AC voltages are rectified to +8 VDC, +5 VDC, and +35 VDC levels by the DC power supply circuit on the control board.

(1) Filter board

The filter board consists of the power switch, AC fuse and AC noise filter.

(2) Power transformer

If the internal temperature of the power transformer rises abnormally the built-in temperature fuse will open to prevent any damage to other electrical components.

(3) Power supply circuit

Rectifies the AC voltage input to +8 VDC, +5 VDC and +35 VDC and supplies it to the control board.

3.2 Mechanical Operation

3.2.1 The printhead mechanism and its operation (See Figure 3-3.)

The printhead is a spring charged type 24-pin driving head utilizing a permanent magnet. It is attached to the carriage and moves parallel with the platen.

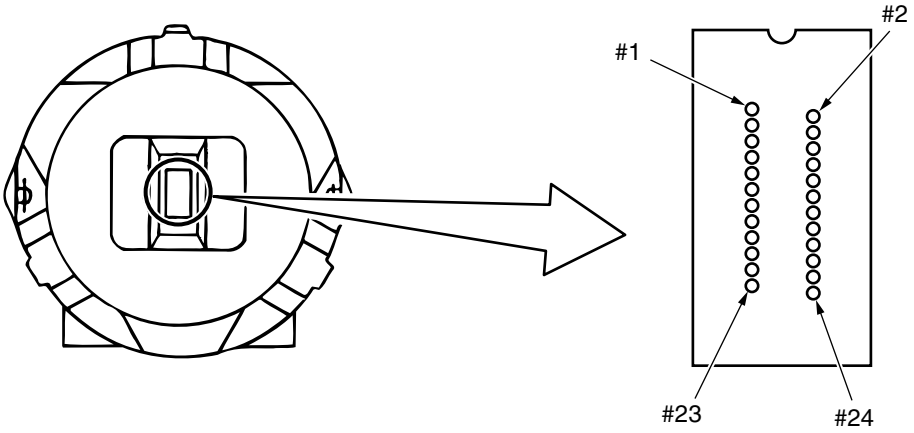


Figure 3-2 Arrangement of the head pins (View from the top of the printhead)

(1) The printhead is composed of the following parts:

(a) Wire guide

(b) Print wires

(c) Armature assembly

(d) Yoke

(e) Spring

(f) Spacer

(g) Magnet assembly

(h) Thermistor

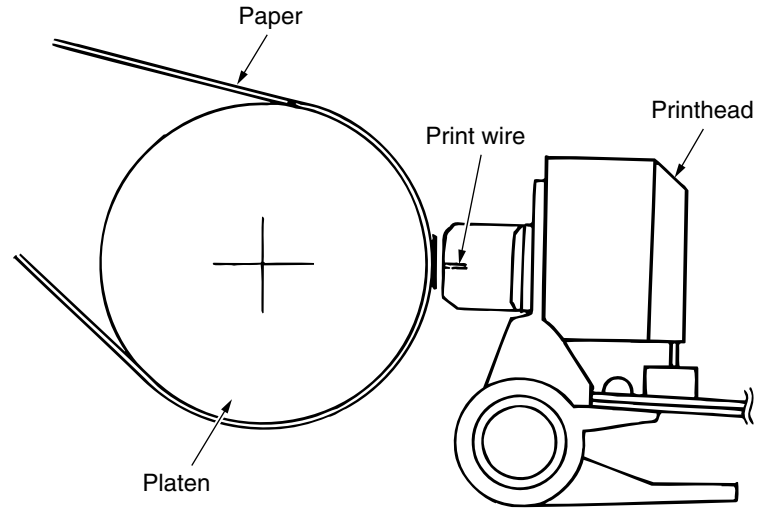
(i) Printed circuit board

(2) Operation of printhead

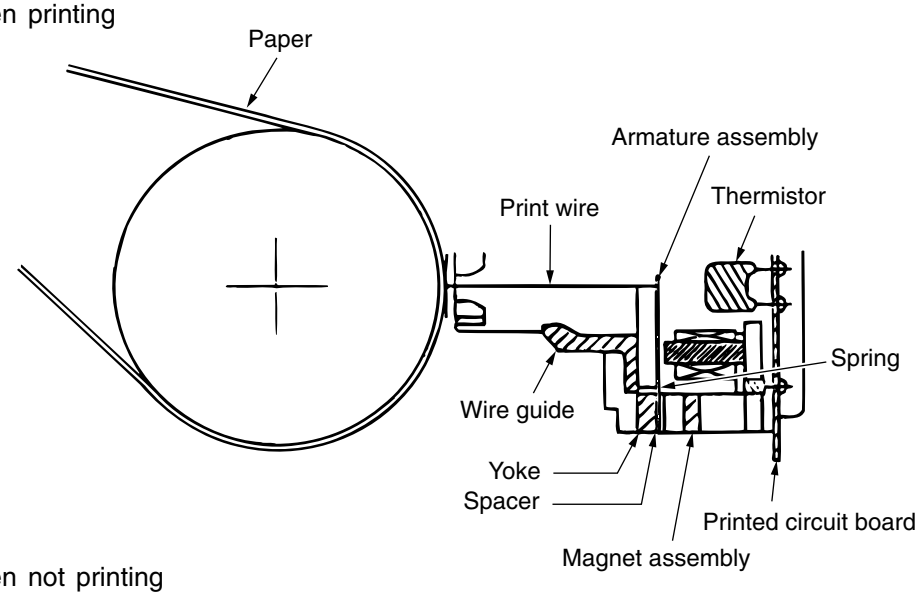
When the printhead is inactive, the armature is attracted to a permanent magnet and the spring attached to the armature is compressed. The print wires attached to each armature are thus concealed inside the wire guide.

When a signal for a character to be printed is detected, current flows through the coil. The magnetic fluxes (caused by the permanent magnet which is situated between the armature and the poles) are canceled, removing the attracting force. The armature is driven in the direction of the platen by the force of the armature spring expanding. The print wire attached to the armature protrudes from the tip of the wire guide, striking the ribbon and prints a dot on the paper.

After the character has been printed, the armature is attracted to the permanent magnet again and the print wires are concealed inside the wire guide.



(1) When printing



(2) When not printing

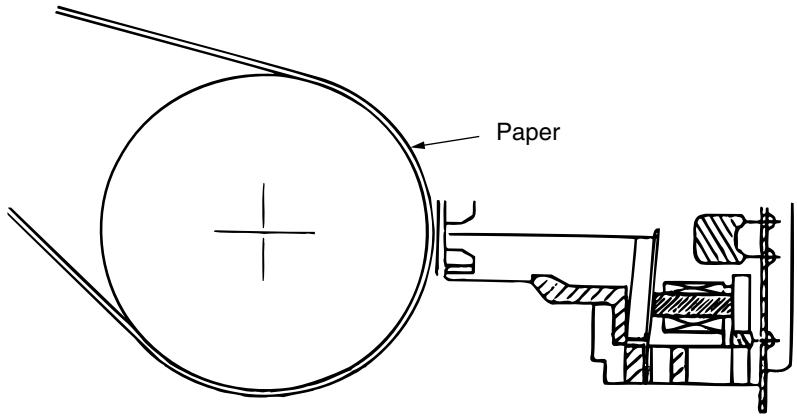


Figure 3-3

3.2.2 Spacing (See Figure 3-4.)

Spacing is performed when the carriage mounted on the carriage shaft and the space rack are driven by the stepping motor.

(a) Stepping motor
(b) Drive pulley
(c) Idle pulley
(d) Carriage shaft
(e) Carriage frame
(f) Space rack

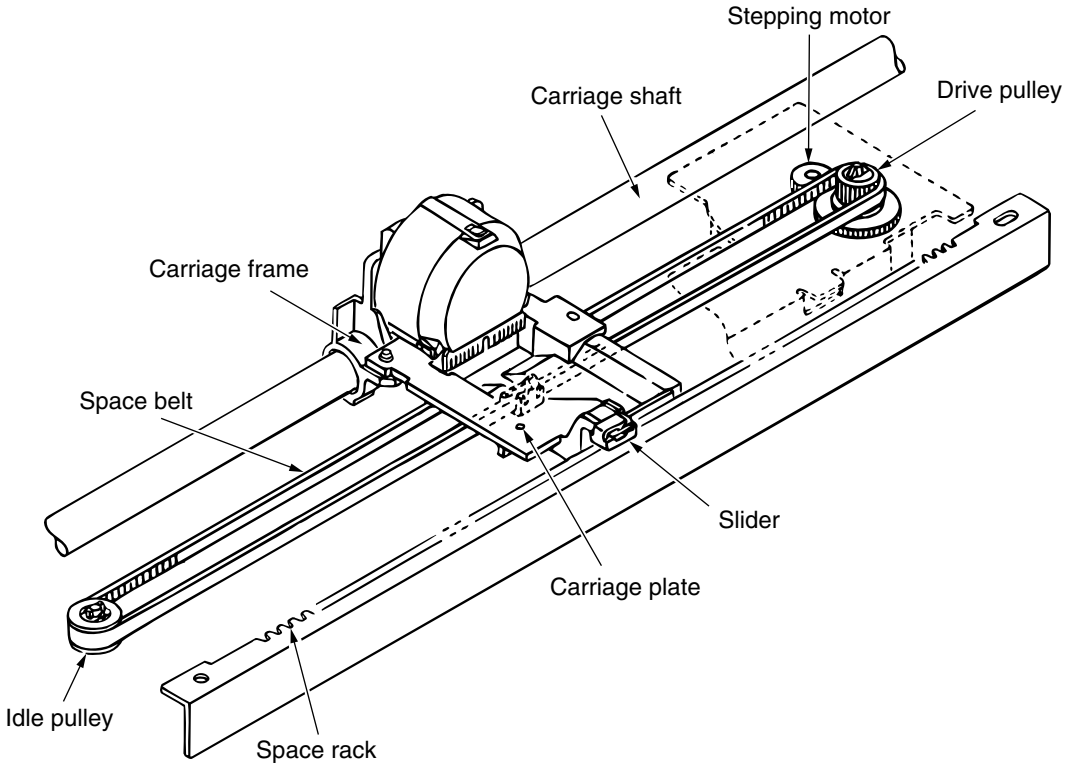


Figure 3-4

(1) Spacing operation

The carriage mounting the printhead moves in parallel with the platen by the carriage shaft and space rack, and is fixed by the space belt at the bottom of the carriage plate.

When the stepping motor rotates clockwise as viewed from above, the driving force is transmitted to the space belt through the drive pulley and the carriage moves from left to right.

The carriage is designed to move 0.8 inch (20.32 mm) when the stepping motor performs one rotation.

3.2.3 Head gap adjusting (See Figure 3-5.)

The head gap adjusting mechanism adjusts the gap between the platen and printhead in accordance with the thickness of paper.

This mechanism adjusts gap between the platen and printhead by rotating the adjust lever on the left of the printer mechanism and the eccentric collar fixed to the right end of the carriage shaft.

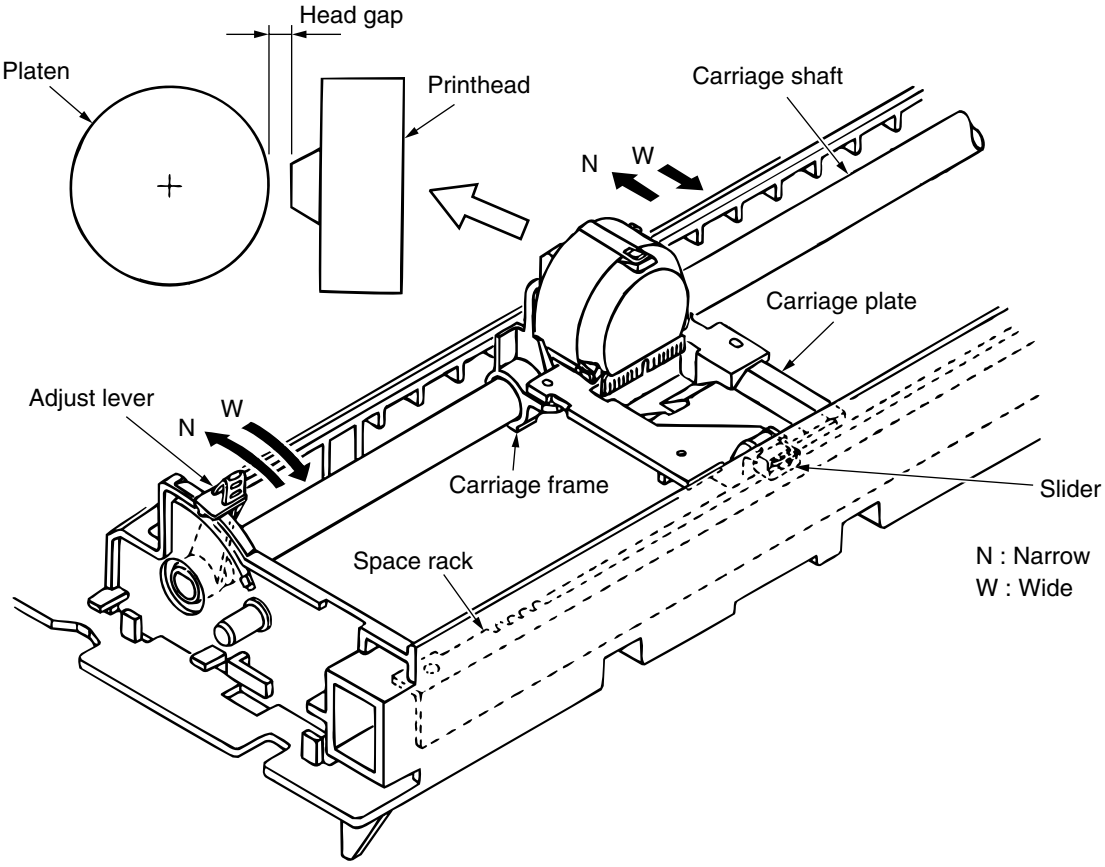


Figure 3-5

3.2.4 Ribbon drive (See Figure 3-6.)

The ribbon drive mechanism moves the ribbon in synchronization with the space motor operation.

The ribbon drive mechanism consists of the following items:

(a) Ribbon feed gear assembly

(b) Space rack

(c) Ribbon cartridge

(1) Ribbon cartridge

An endless ribbon with a single direction feed is used. Ink is supplied from an ink tank, which is built in to the ribbon cartridge.

(2) Ribbon feed operation

The rotation of the space motor is transmitted to the drive gear in the ribbon cartridge through the space rack and ribbon feed gear assembly. Thereby feeding the ink ribbon.

The feed direction of the ribbon is maintained by switching the rotational direction of the gears in the ribbon drive gear assembly. This ensures ribbon movement when bidirectional printing is used.

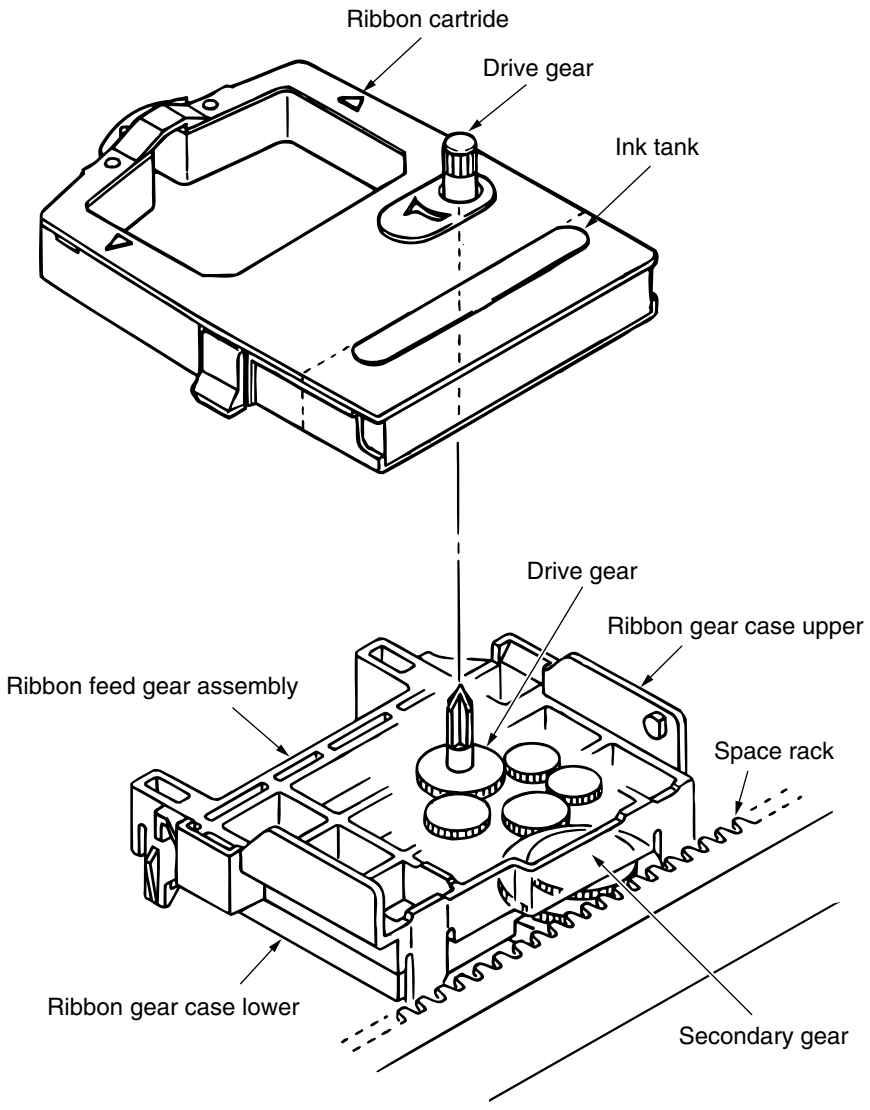


Figure 3-6

3.2.5 Paper feed

Paper feeding is performed by turning the platen and the sheet feeder assembly, which is driven by the stepping motor.

The paper feed mechanism consists of the following items:

(a) Stepping motor

(b) Decelerating gears

(c) Platen

(d) Tractor feed unit

(e) Pressure roller

(1) Cut-sheet feed operation (See Figure 3-7.)

The stepping motor used for the paper feed mechanism is mounted on the left side of the printer frame, and the rotation of the stepping motor is transmitted through decelerating gears (idler gear, platen gear) to the platen. The rotation of the platen is also transmitted to the tractor unit via transmission gear.

It is designed in such a way that if the stepping motor rotates 60 steps, paper is fed 1/6 inch (4.23 mm).

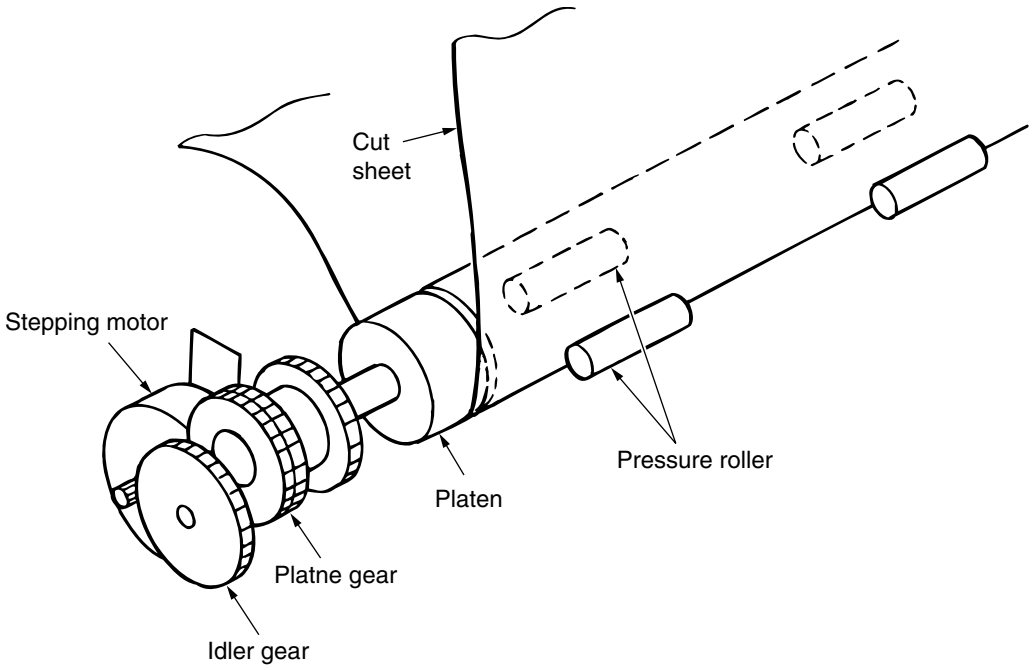


Figure 3-7

(2) Continuous paper feed operation (See Figure 3-8.)

The force transmitted to the platen, as explained in Paragraph (1) for cut sheet feed operation, rotates tractor gear through the platen gear A, the idler gear and the change gear. The rotation of tractor gear makes the pin tractor belt rotate through a sheet feeder shaft, feeding the continuous paper.

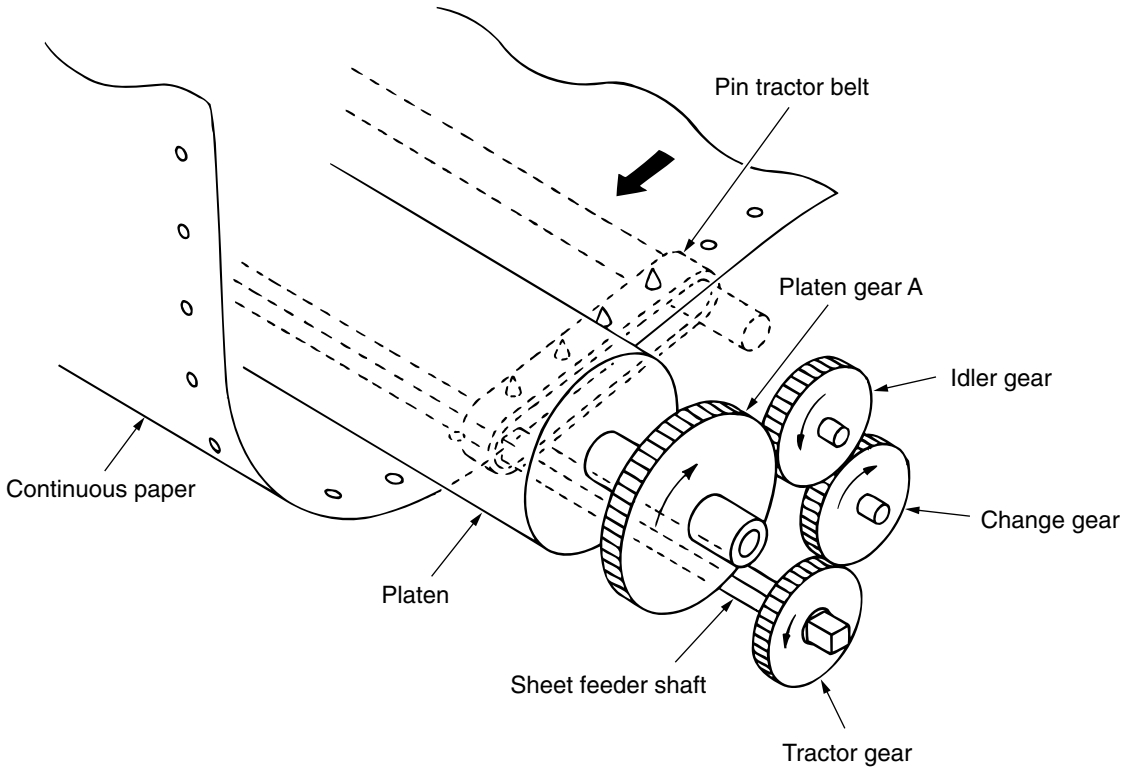


Figure 3-8 Paper feed operation for continuous paper

(3) Cut-sheet and continuous paper switching mechanism (See Figure 3-9.)

The selection of cut-sheet and continuous paper is done by using the release lever on the right side of the printer mechanism.

When the release lever is pushed back, the change gear is moved inward. As the power transmission from the idler gear to tractor gear is removed, the sheet feeder assembly becomes inoperative.

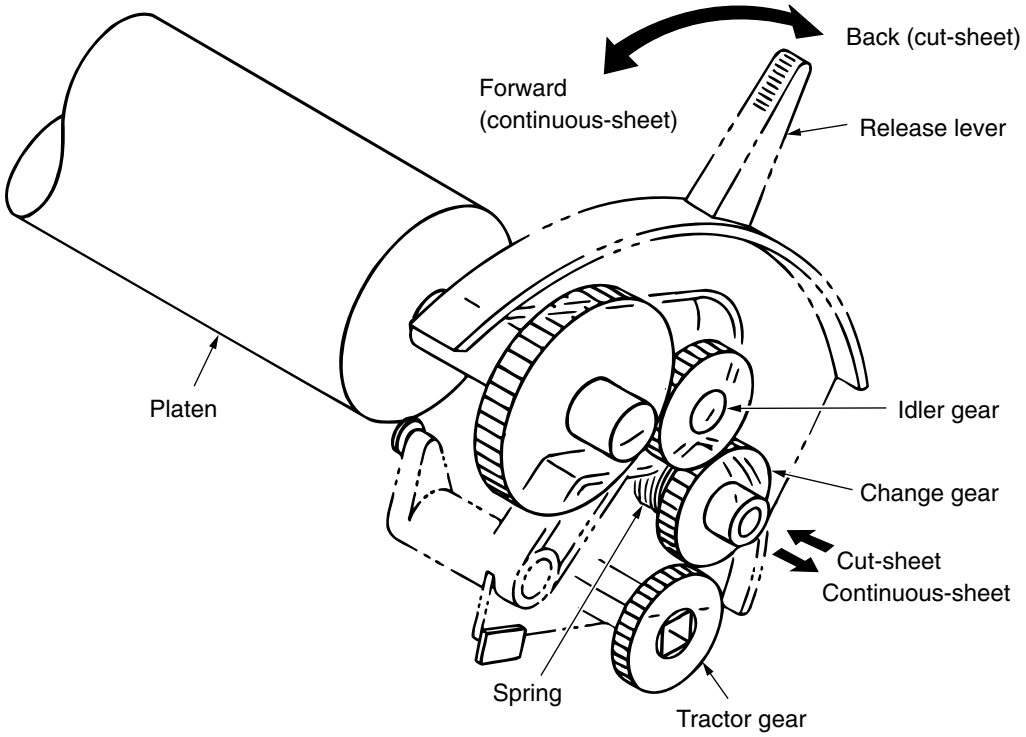


Figure 3-9

Cut-sheet are fed by the rotation of the platen, but continuous paper are not. When the release lever is pulled forward, the change gear moves outward, because the change gear is pressed against the spring for change gear. The rotation of the idler gear is then transmitted to the tractor gear and continuous paper can be fed.

(4) Pull tractor mechanism (option) (See Figure 3.10.)

Bottom feed of continuous paper is possible only when an optional pull tractor unit is installed.

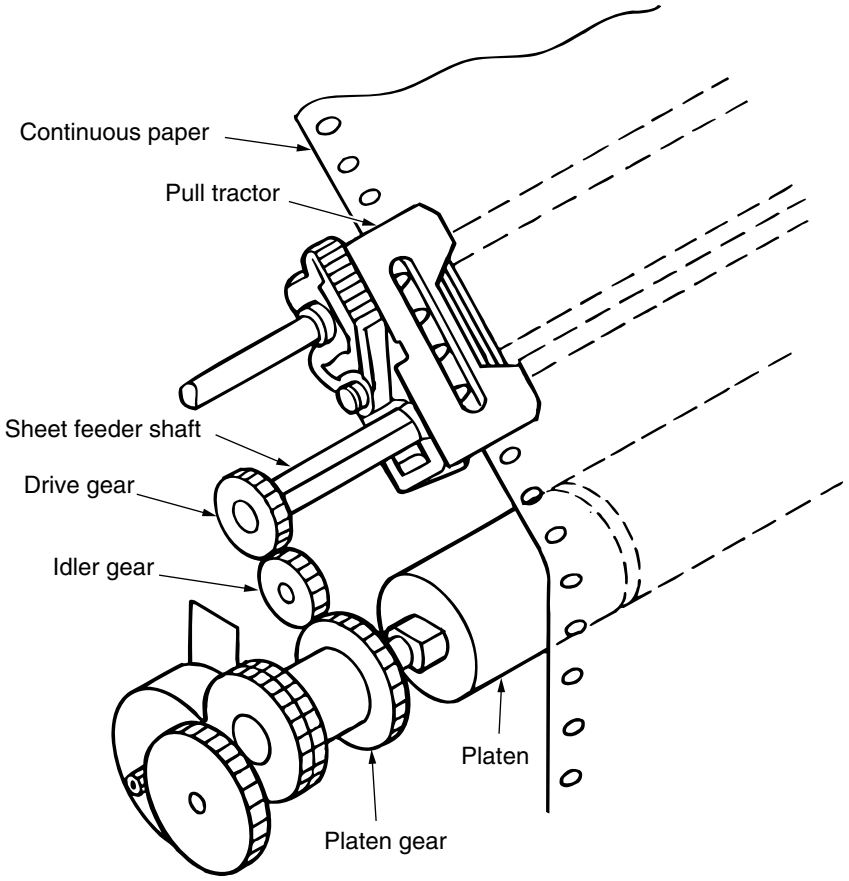


Figure 3-10

The rotation of the platen is transmitted to the idler gear of the pull tractor unit through the platen gear at the left end of the platen. The rotation of the idler gear is transmitted to the drive gear, and continuous forms are fed by the pull tractor being rotated by the sheet feeder shaft.

(5) Paper clamp mechanism (See Figure 3-11.)

When the release lever is pushed to the open position, the release link rotates in a counter-clockwise direction. The release shaft, which is engaged with this, rotates in a counter -clockwise direction at the same time. A clearance is created between the front roller, feed roller and the platen through which paper can be inserted.

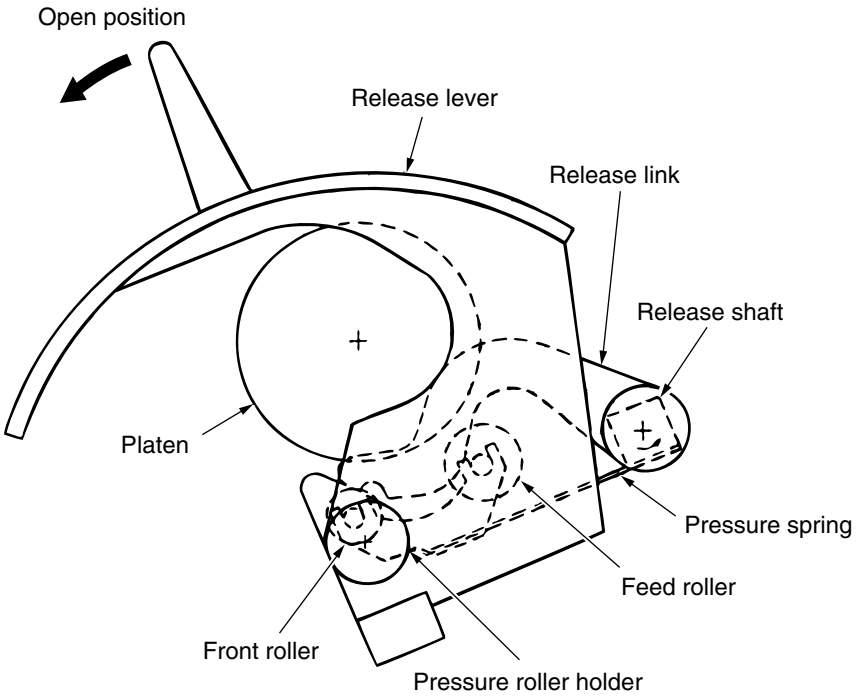


Figure 3-11 (a)

Conversely, if the release lever is pushed in a closed position, the release link rotates in a clockwise direction. The release shaft, which is engaged with this, rotates clockwise at the same time. The front roller and feed roller is pressed against the platen by the pressure spring which is welded to the release shaft, thus feeding is enabled.

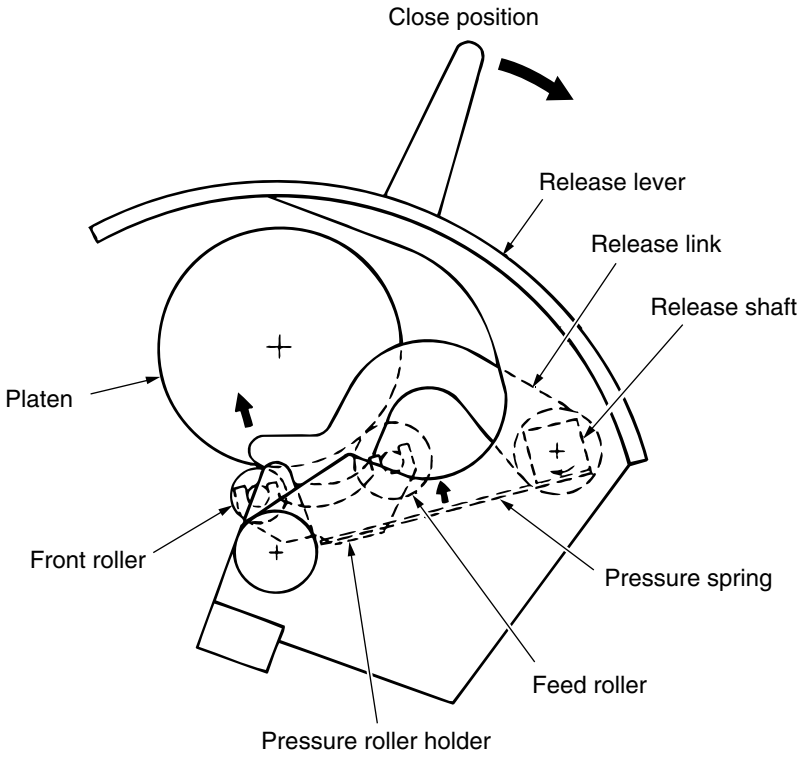


Figure 3-11 (b)

3.2.6 Paper end detection (See Figure 3-12.)

(1) Continuous paper end

When continuous paper is inserted, the paper moves the continuous paper end lever to (a1) and the sensor is on. When the continuous paper is used up, the paper moves the continuous paper end lever to (b1), and the sensor is turned off, thus detecting paper end. Paper end is detected 57 mm to the left of the print position.

(2) Bottom paper end

When paper is inserted, the paper moves the bottom paper end lever to (a2) and the sensor is on. When paper is used up, the bottom paper end lever move to the (b2), and the sensor is turned off, thus detecting paper end. Paper end is detected 36 mm to the left of the print position.

(3) Cut-sheet end

When cut-sheet is inserted, the paper moves the cut-sheet end lever to (a3) and the sensor is on. When the cut-sheet is used up, the paper moves the cut-sheet end lever (b3), and the sensor is turned off, thus detecting paper end.

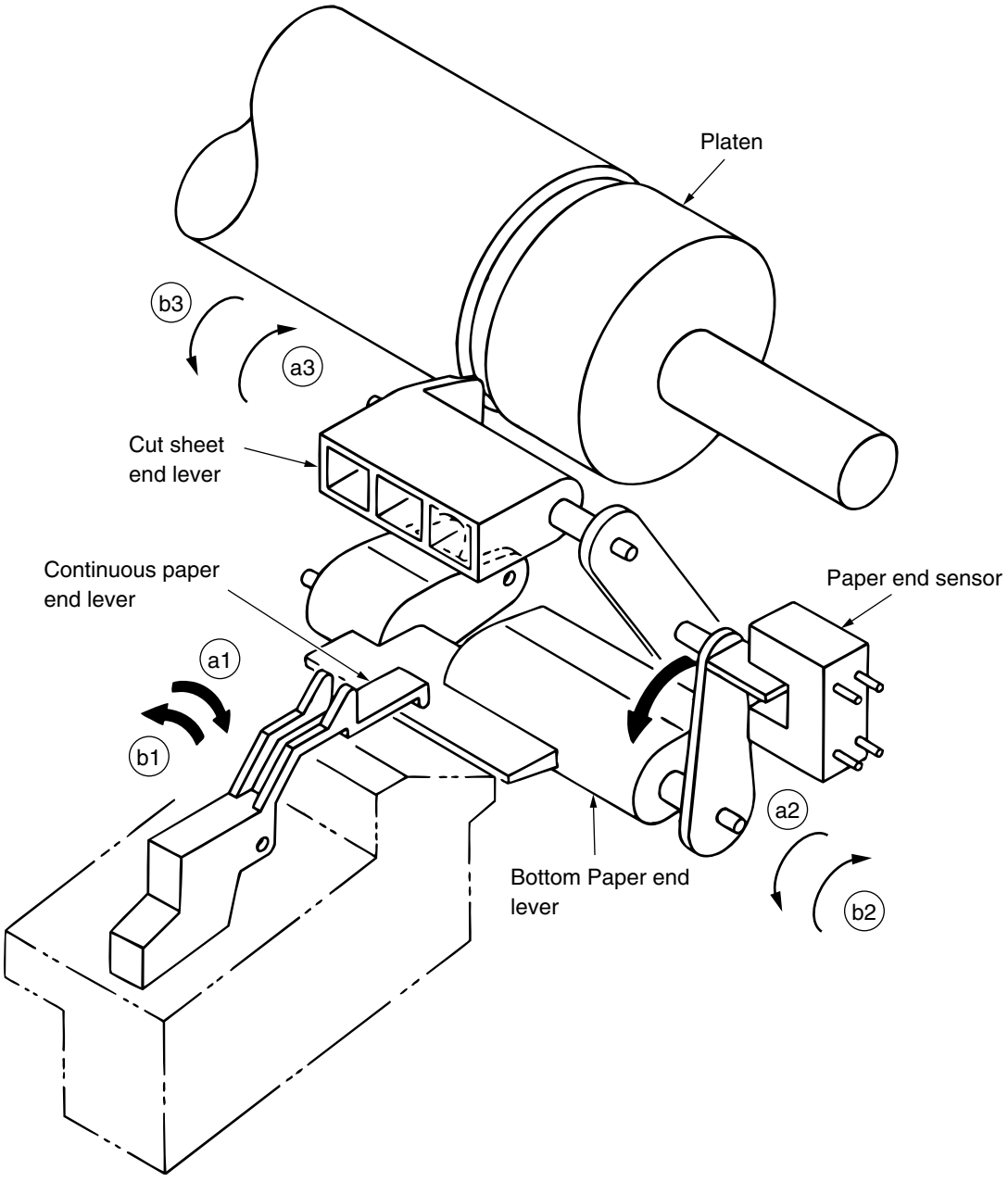

Platen
b3
a3
Cut sheet
end lever
Continuous paper
end lever
Paper end sensor
a1
b1
a2
Bottom Paper end
lever
b2

Figure 3-12

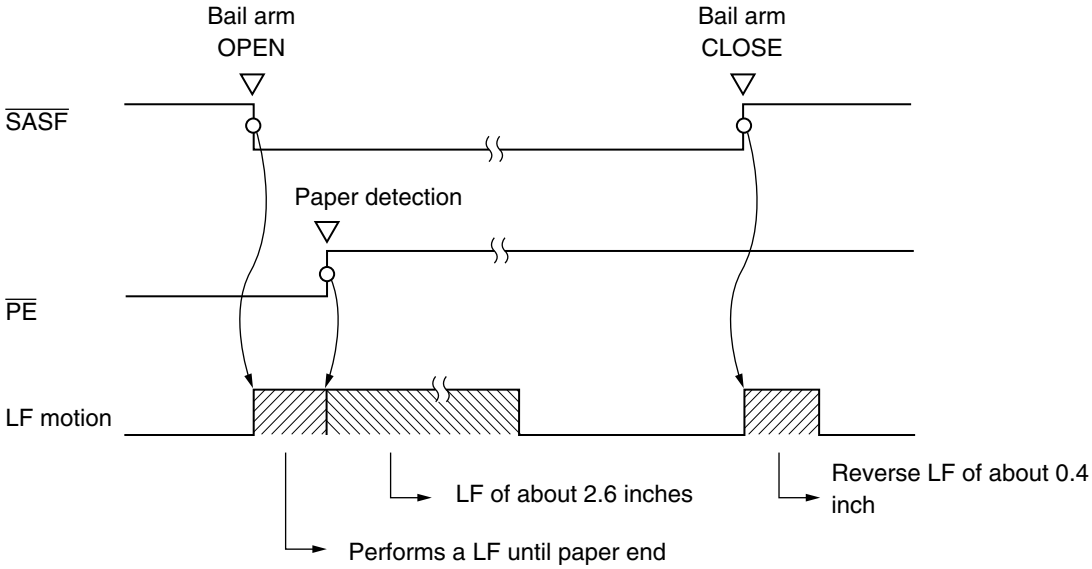
3.2.7 Semi-automatic sheet feeder (SASF) (See Figure 3-13.)

This function sets the print start position of the paper automatically when using cut-sheet and continuous paper.

The procedural operation is as follows:

(1) When using a cut-sheet (SASF)

1) Push the release lever to the cut-sheet side (rear side).
2) Insert a cut sheet form behind the platen.
3) Pull the bail arm forward to set it to the open state, causing the SASF switch to be turned on.
4) LF operation is started and the cut sheet will be fed to the print position.
5) About 2.6 inches of a cut sheet is fed.
6) If the bail arm is returned to the original position, a reverse LF of about 0.4 inch is performed.



When the bail arm is open, the LF motor is driven to feed 2.6 inches of paper. When the LF motor drive has finished this, and if a sheet has not been fed, the SASF motion becomes invalid and is handled as an ordinary paper end.

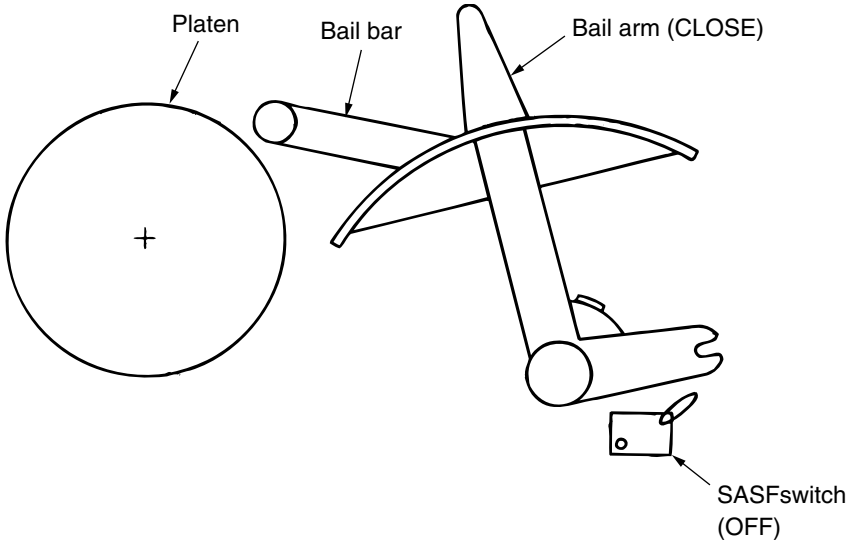


Figure 3-13(a)

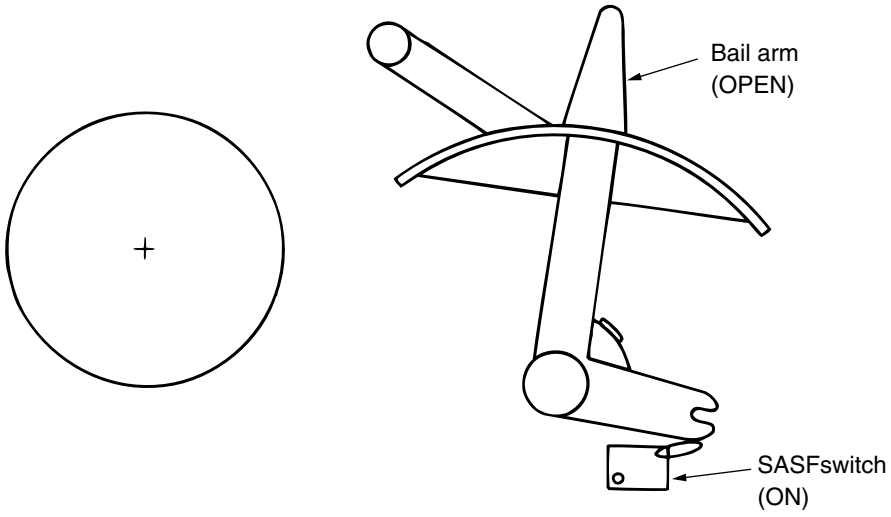
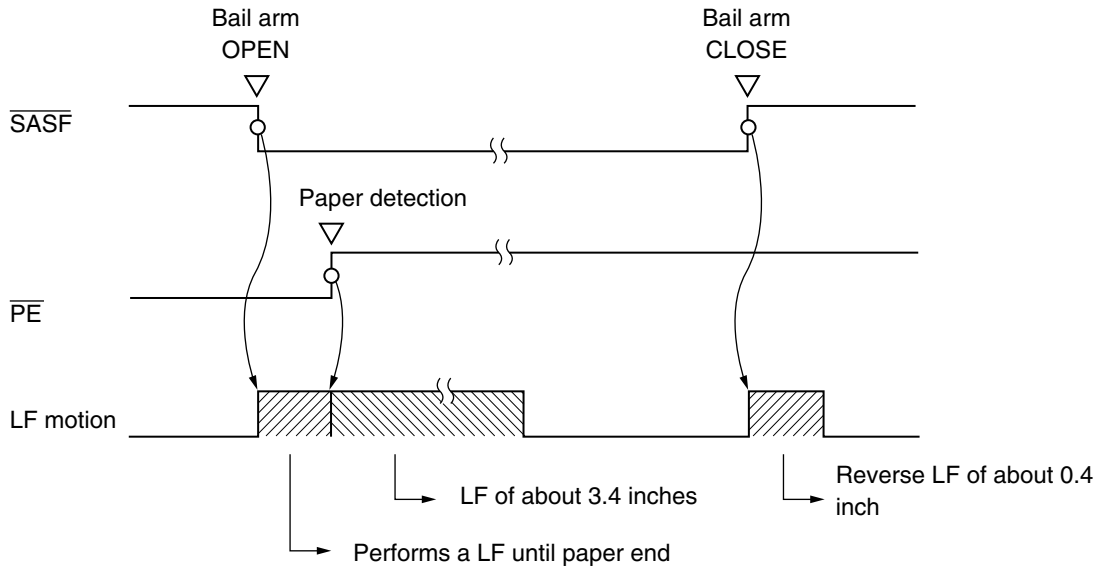


Figure 3-13(b)

(2) When using continuous paper (rear feed) (Auto Load)

1) Set the release lever to the continuous paper side.
2) Insert the paper in the push tractor.
3) Pull the bail arm forward to the open state, turning on the SASF switch.
4) The LF action is started, and the paper will be fed to the print position.
5) About 3.4 inches of a sheet is fed.
6) When the bail arm is returned to the original position, a reverse LF of about 0.4 inch is performed. The position is about 11/12 inch from the top of a paper for the print start line.



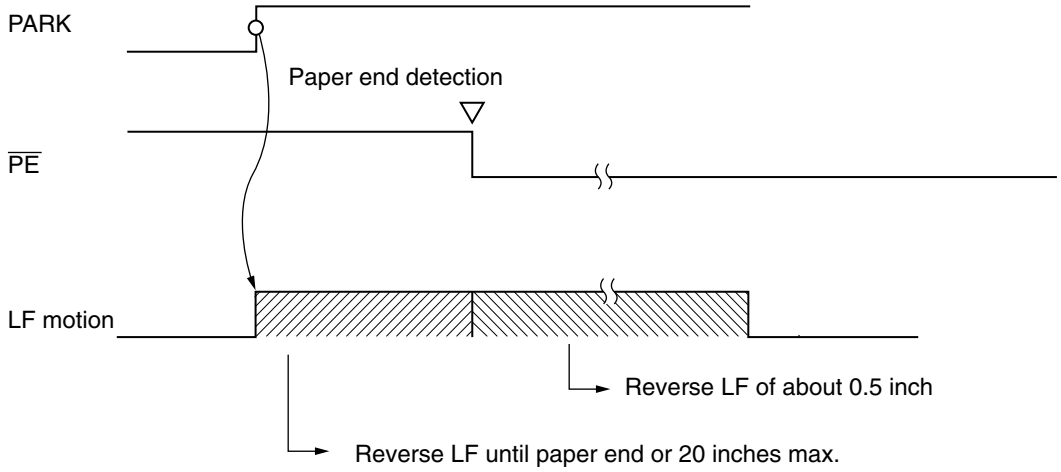
When the bail arm is open, the LF motor is driven to feed 3.4 inches of paper. When the LF motor drive has finished this, and if a paper has not been fed, the Auto load action becomes invalid and is handled as an ordinary paper end.

3.2.8 Continuous paper park

Continuous paper which have been inserted can be reversed automatically by using the “TOF/PARK” button on the operation panel.

Its operation is as follows:

1) Press the “TOF/PARK” button on the operation panel.
2) Reverse LF is started and the paper is fed reversely until paper end occurs or 20 inches maximum.
3) Then about 0.5 inch of the paper is fed reversely, leaving the paper on the push tractor only.



4. ASSEMBLY/DISASSEMBLY

4.1 Precautions for Parts Replacement

(1) Before disassembling and assembling, remove the AC cable and the interface cable.

(a) After turning off the AC power switch, remove the AC inlet plug of the AC cable from the AC receptacle, and then remove the AC cable from the printer.

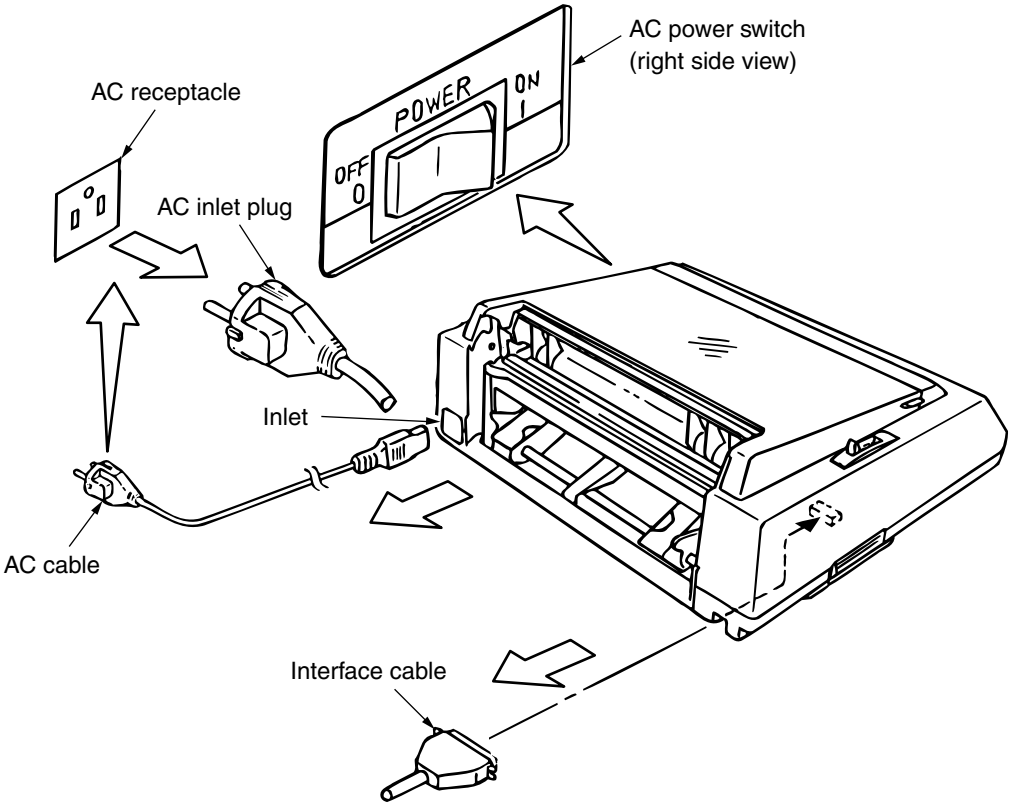
⚠Warning	Risk of electric shock	

There is a risk of electric shock during replacement of the power supply.

Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cable is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

(b) To connect the AC cable again, connect it to the inlet of the printer, and then connect the AC inlet plug to the AC receptacle.



(2) Do not disassemble the printer as long as it is in good operating condition.

(3) Be careful not to remove parts unless necessary. Disassembly should be the minimum necessary.

(4) Use only the specified maintenance tools.

(5) Disassemble the printer in the specified order of disassembly procedures.

(6) ICs such as the microprocessor, ROM, and RAM can easily be damaged by static electricity. Do not wear any items of clothing that are apt to produce static electricity when handling printed-circuit boards.

(7) Do not place the printed-circuit boards directly on the printer or the floor.

4.2 Maintenance Tools

The tools which are required to replace printed circuit boards and other parts in the field are shown in Table 4-1. Tools other than those mentioned below may become necessary for other maintenance procedures.

Table 4-1 Maintenance tools

No.	Maintenance tool	Quantity	Purpose of tool	Remarks
1	Screwdriver Set	1		
2	Round pliers No.1	1		
3	Thickness gauge set	1	For head gap adjustment	
4	Volt-ohm-milliammeter	1		

4.3 Disassembly/Reassembly Procedure

Explained in this section are the methods for removing and reinstalling the assemblies shown in the following disassembly diagram. The procedures explained apply to removing the assemblies. Reverse the procedures, in principle, when reinstalling the assemblies.

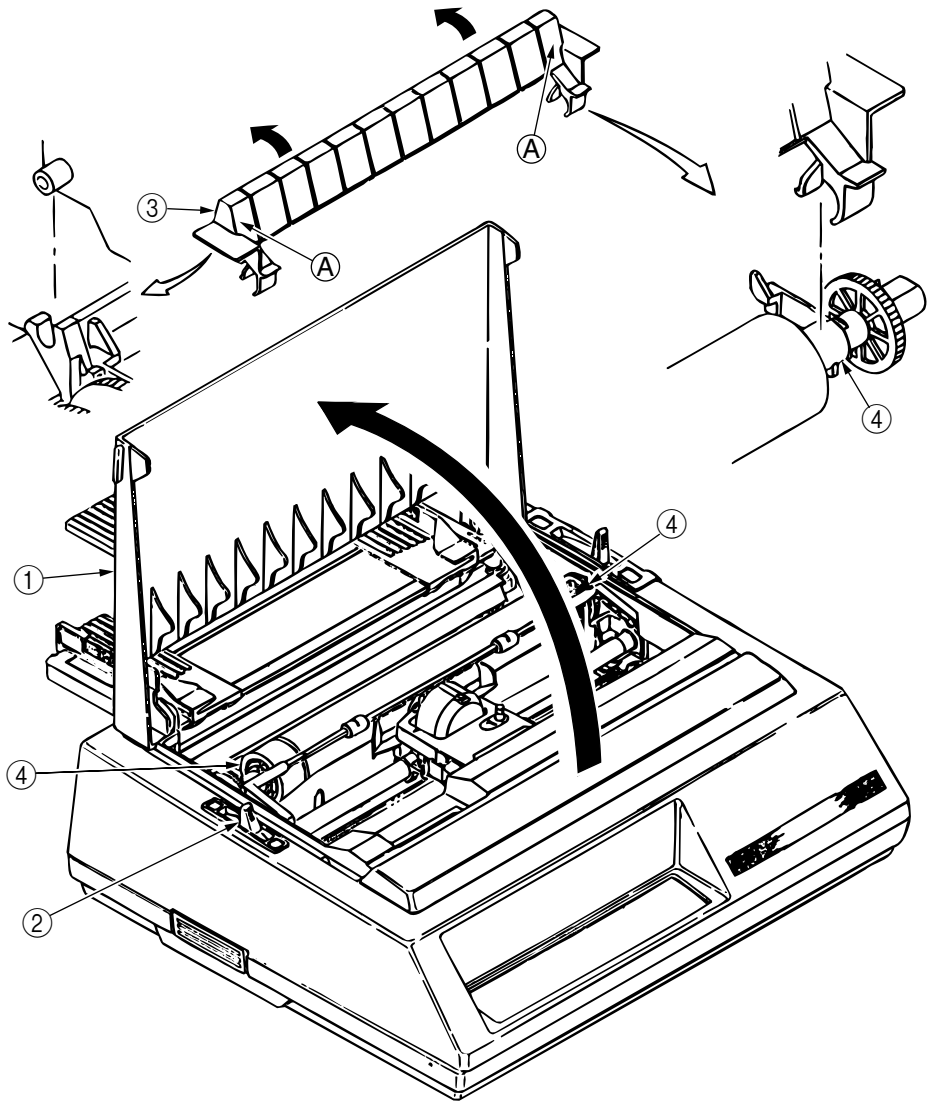
- 4.3.1 Paper separator
- 4.3.2 Printhead
  - 4.3.3 Space rack
  - 4.3.4 Ribbon feed gear assembly
    - 4.3.5 Space belt
- 4.3.6 Upper cover assembly
  - 4.3.7 Head cable
  - 4.3.8 Operation panel
    - 4.3.9 Control board
  - 4.3.10 LF motor
    - 4.3.11 Paper end sensor
  - 4.3.12 Bail arm (L)
  - 4.3.13 Bail bar
  - 4.3.14 Carriage frame
  - 4.3.15 Platen assembly
    - 4.3.16 Pressure roller assembly
    - 4.3.17 Paper pressure guide
    - 4.3.18 Ribbon protector
  - 4.3.19 Tractor assembly
  - 4.3.20 Microswitch assembly
  - 4.3.21 Printer mechanism
    - 4.3.22 Power supply unit
    - 4.3.23 Space motor
    - 4.3.24 Bottom paper and lever

4.3.1 Paper separator

(1) Open the access cover ① upward.

(2) Pull bail lever ②.

(3) Push section Ⓐ, slightly push paper separator ③ back, and remove the paper separator from the platen bearing ④.



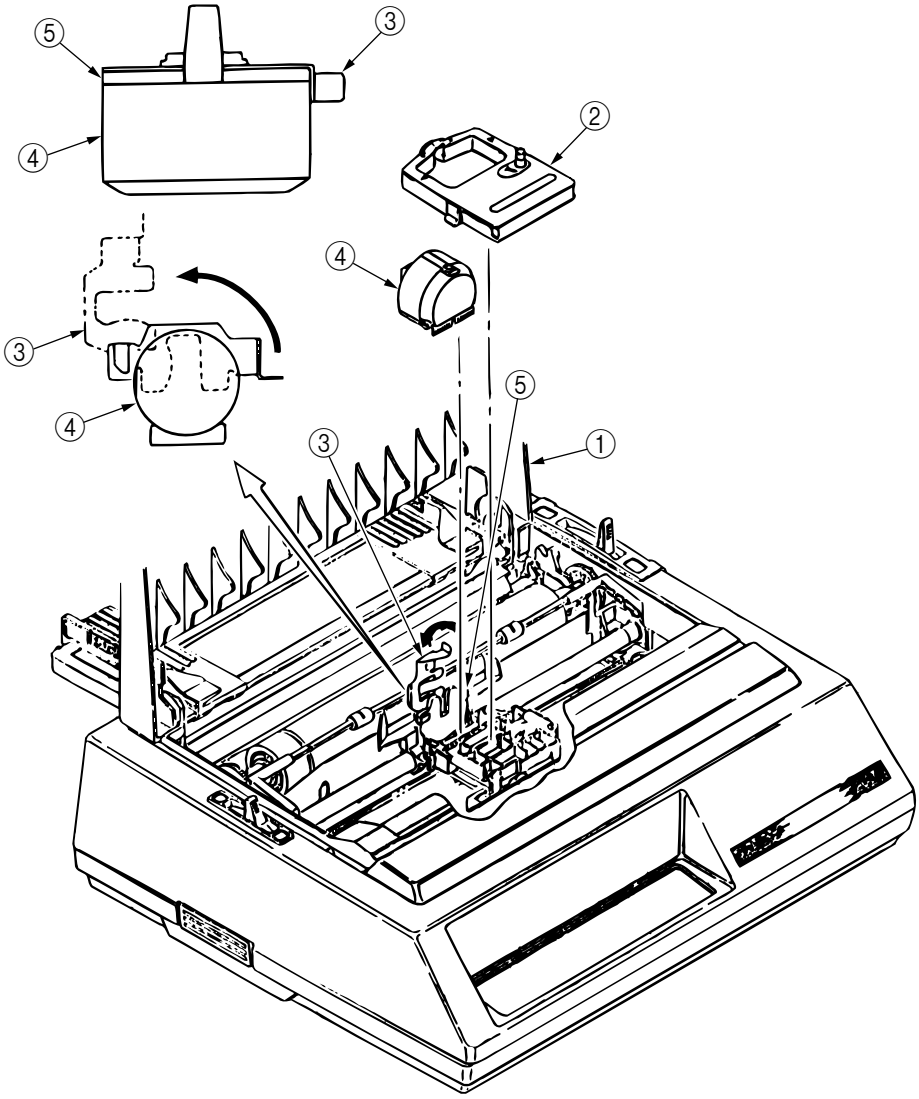
4.3.2 Printhead

(1) Open access cover ① upward.

(2) Remove ribbon cassette ②.

(3) Turn the head clamp ③ to the left about 90˚, and unlock printhead ④.

(4) Remove printhead ④ from carriage frame ⑤.



4.3.3 Space rack

(1) Remove the printhead. (Se Item 4.3.2.)

(2) Remove two screws ② installing carriage plate ①. (Do not remove the ribbon feed gear assembly.)

(3) Slide carriage frame ③ . (Arrow Ⓐ)

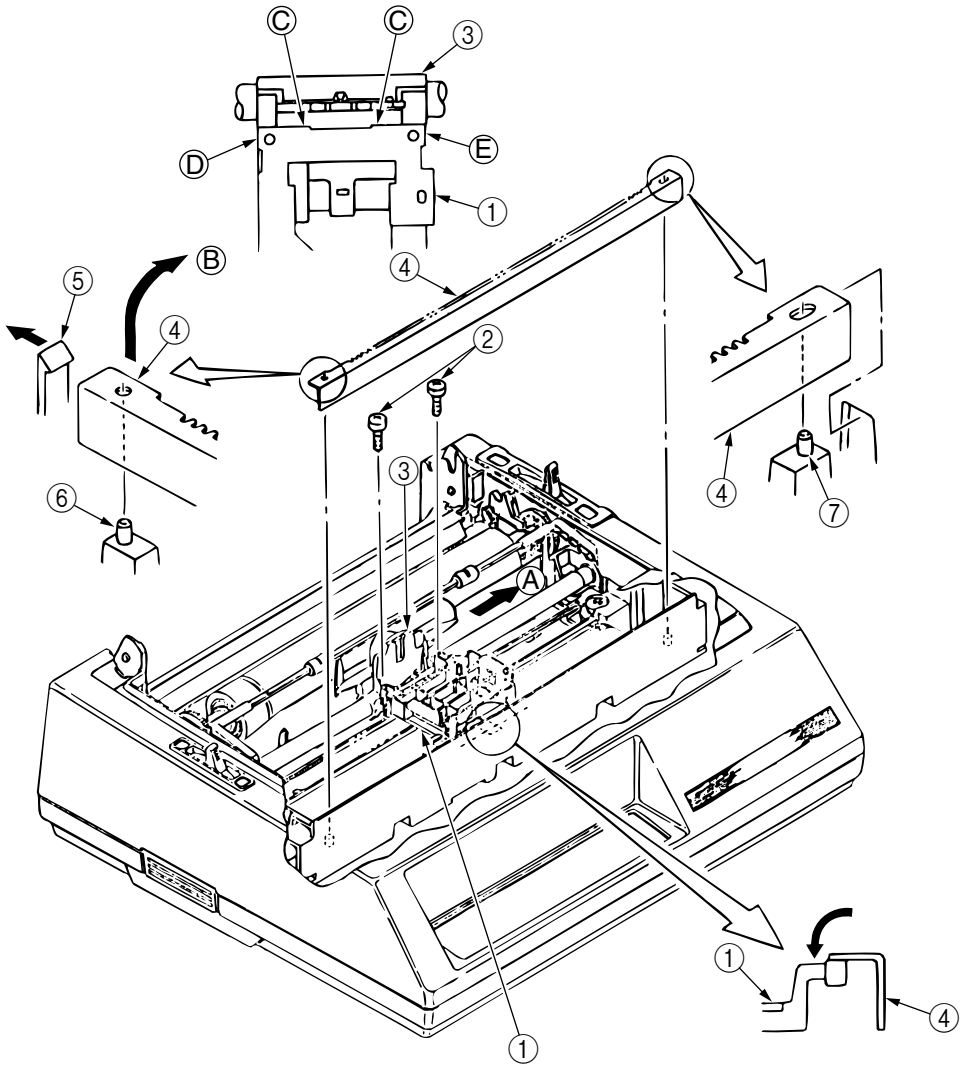
(4) Set carriage plate ① under space rack ④.

(5) Move claw ⑤ outward, remove the left part of space rack ④ from guide pin ⑥, and lift part ④ to 45˚. (Arrow Ⓑ)

(6) Remove the right part from guide pin ⑦, and remove space rack ④ while shifting it to the left.

(Note on installation)

1. When installing carriage plate ①, set the plate to section Ⓒ of carriage frame ③, then screw in sections Ⓓ and Ⓔ.



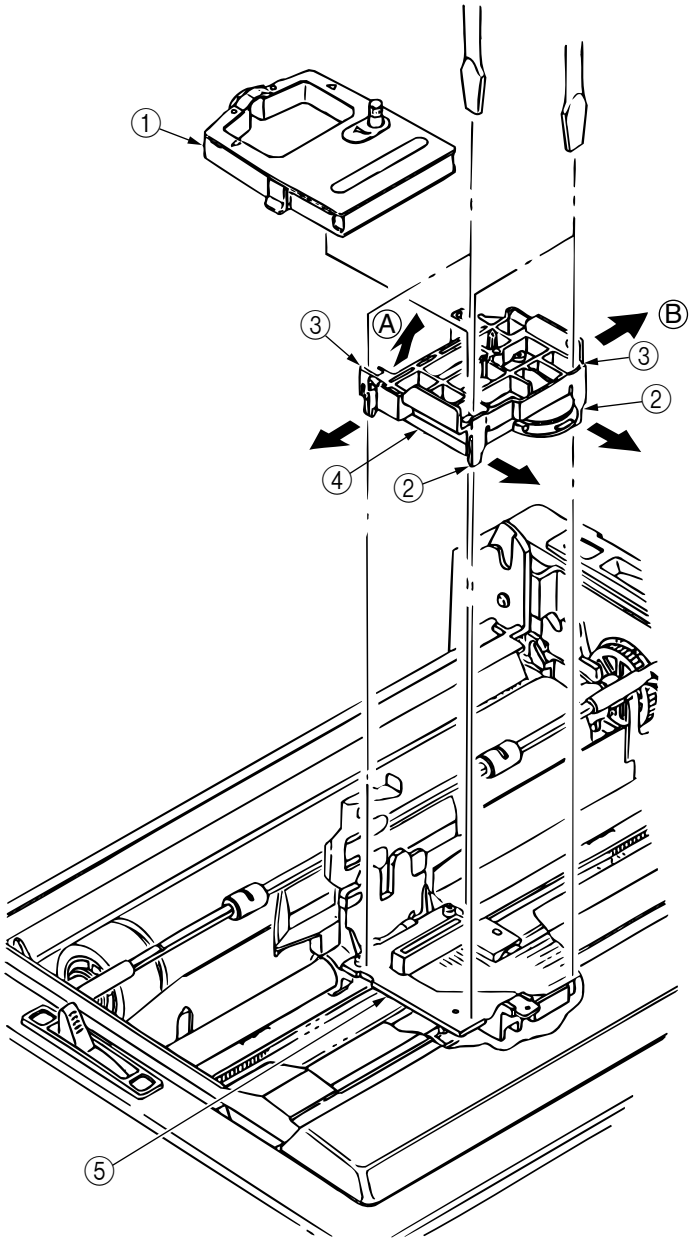
4.3.4 Ribbon feed gear assembly

(1) Remove ribbon cassette ①.

(2) Remove the printhead. (See Item 4.3.2.)

(3) Release four claws ②. (Insert the screwdriver into groove ③, and pry claws away from carriage plate ⑤.)

(4) Lift ribbon feed gear assembly ④ in the direction of arrow Ⓐ, slide it in the direction of arrow Ⓑ, and then remove it.



4.3.5 Space belt

(1) Remove ribbon feed gear assembly. (See Item 4.3.4)

(2) Remove belt tension spring ①, self tapping screw ⑨, and remove belt ③ from idle pulley ②.

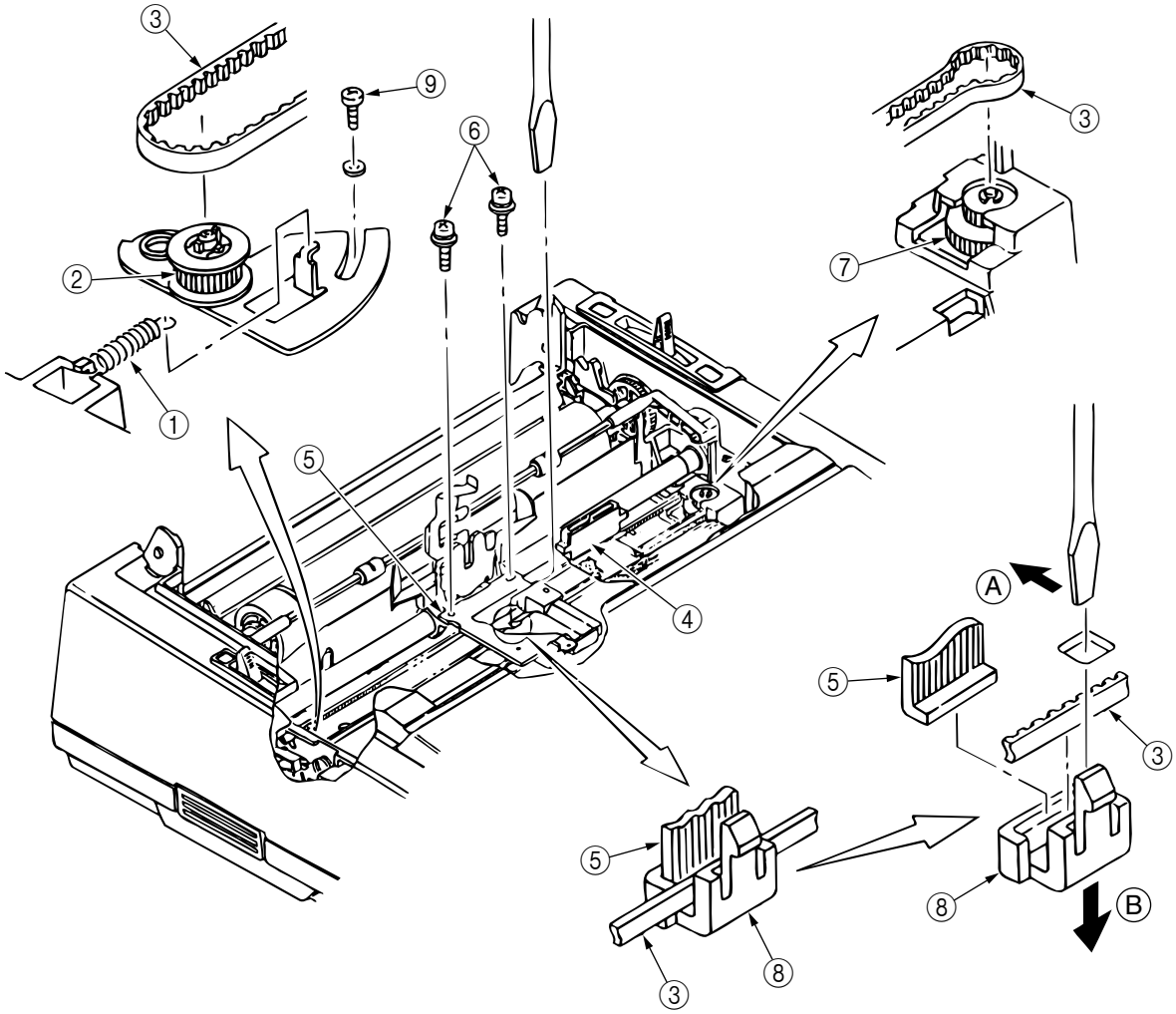
(3) Remove head connector assembly ④ from carriage plate ⑤.

(4) Remove two screws ⑥, and remove carriage plate ⑤.

(5) Remove belt ③ from the drive gear ⑦.

(6) Remove belt clamp ⑧ mounted to the bottom of carriage plate ⑤.

After pushing the claw of belt clamp ⑧ in the direction of arrow Ⓐ using the screwdriver, remove belt clamp ⑧ and belt ③ by lowering the claw in the direction of arrow Ⓑ.



4.3.6 Upper cover assembly

(1) Remove the paper separator. (See Item 4.3.1.)

(2) Remove platen knob ①.

(3) Raise sheet separator ② fully (Arrow Ⓐ), and remove two screws ③.

(4) Lift Access cover ⑨ in the direction shown by Arrow Ⓔ-1, and remove the IC card ⑪.

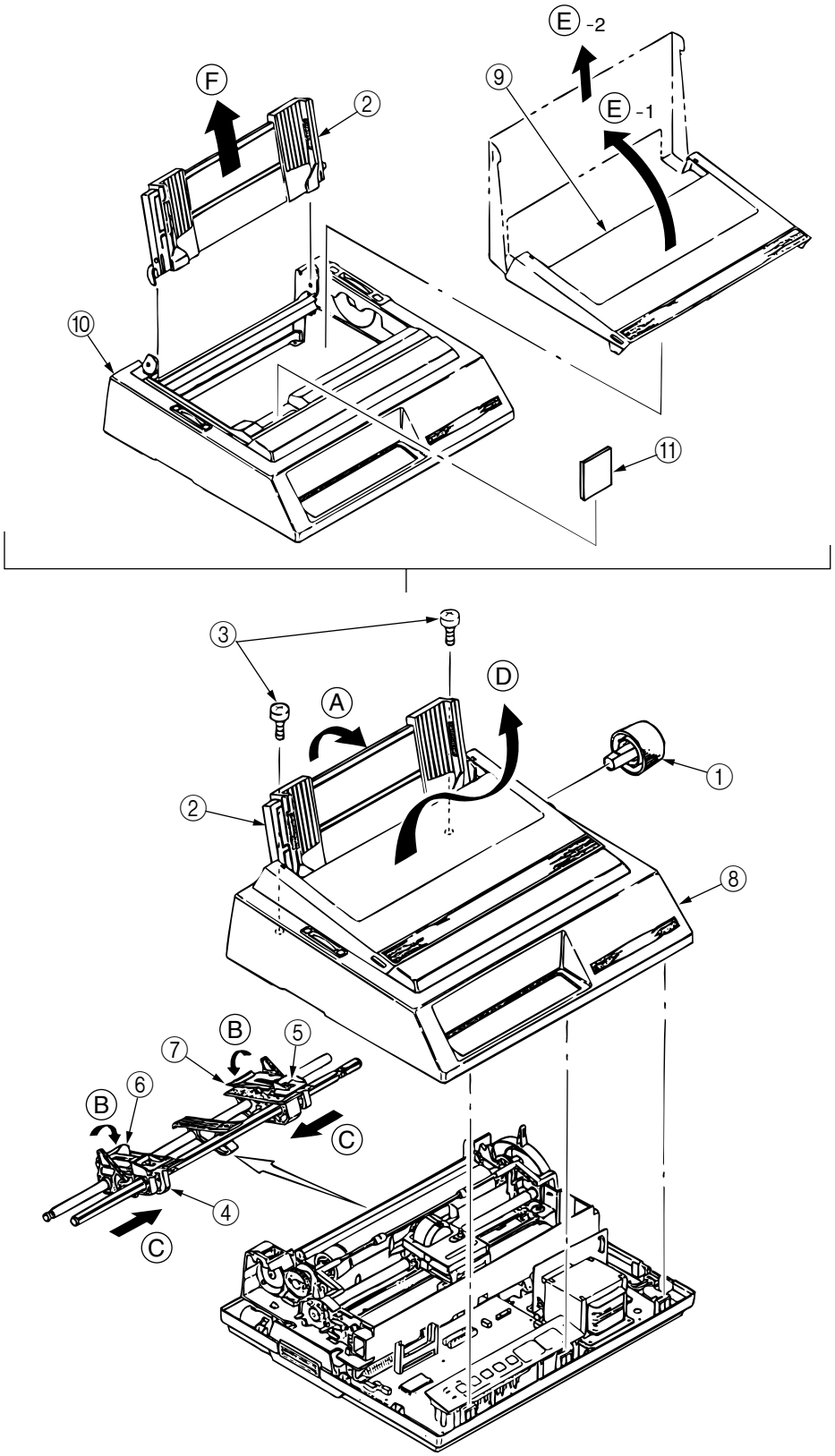
(5) Close tractor covers (L) ⑥ and (R) ⑦ of tractor assemblies ④ and ⑤. (Arrow Ⓑ)

(6) To avoid interference when removing the upper cover, move pin tractor assemblies ④ and ⑤ to the center of the printer unit. (Arrow Ⓒ)

(7) Lift the rear part of upper cover ⑧, pull it forward a little and remove. (Arrow Ⓓ)

(8) Raise Access cover ⑨ to the full, and remove it from middle cover ⑩. (in the order of Arrows Ⓔ-1 and Ⓔ-2)

(9) Raise sheet separator ②, and pull it out diagonally. (Arrow Ⓕ)


E -2
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E -1
2
10
11
3
A
D
1
2
8
B
5
7
6
B
C
4
C

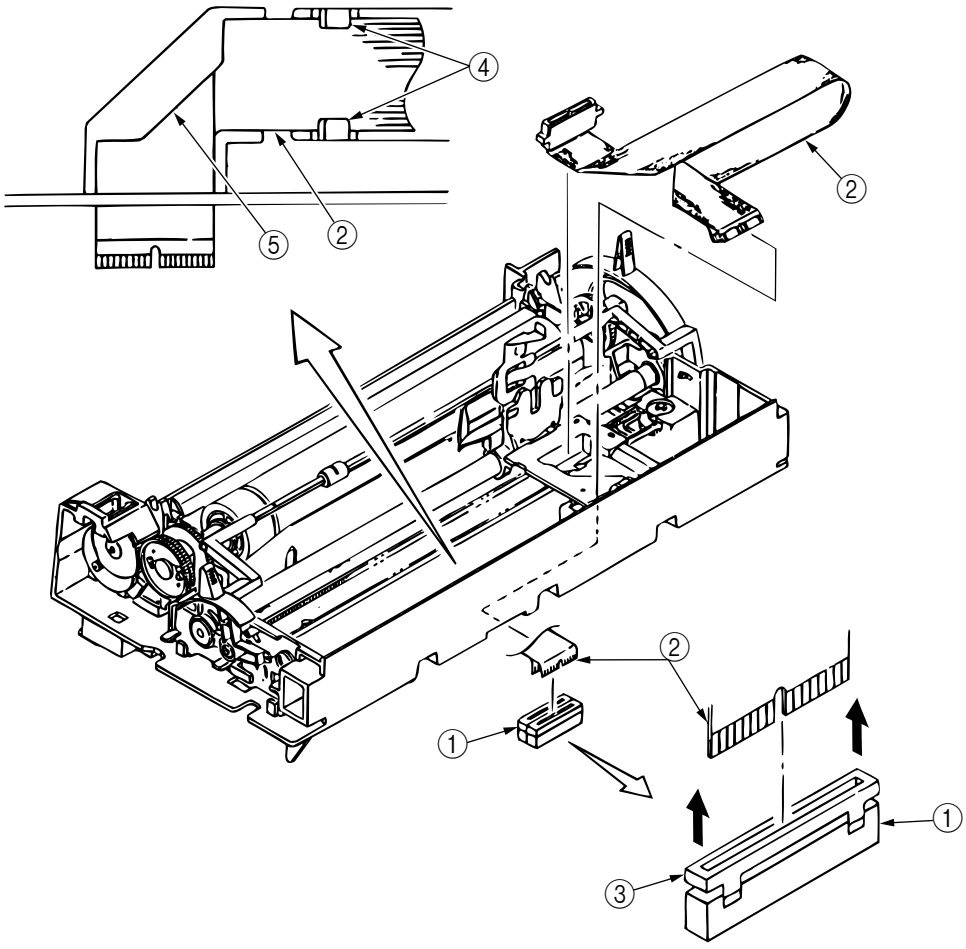
4.3.7 Head cable

(1) Remove the ribbon feed gear assembly. (See Item 4.3.4.)

(2) Remove upper cover assembly. (See Item 4.3.6.)

(3) Remove two head cables ② from connector ① of the control board. (When cable clamp ③ is pulled, it is released and head cable ② is removed.)

(4) Pull head cable ② under cable guides ④ and ⑤, and remove the head cable.



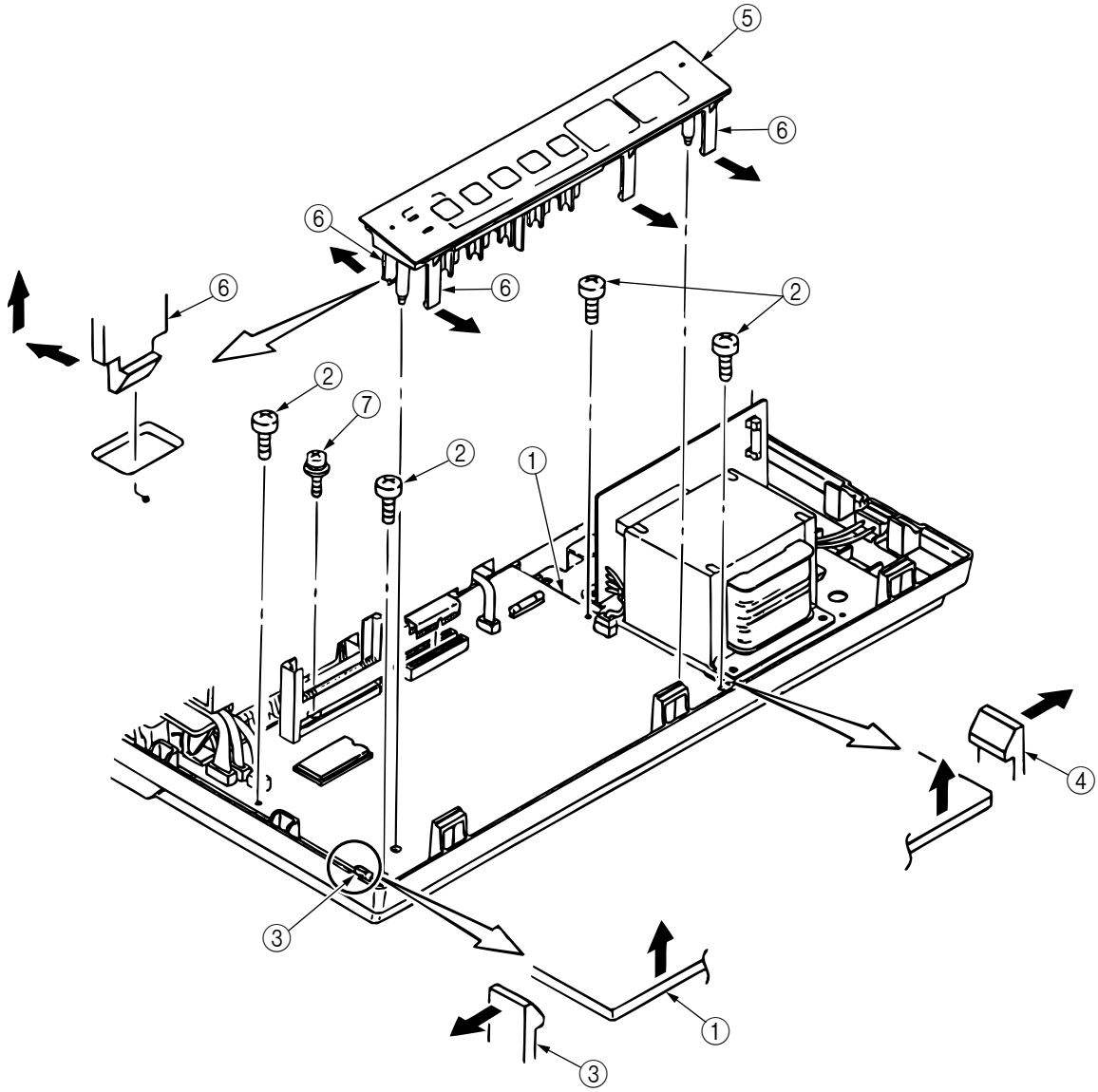
4.3.8 Operation panel

(1) Remove the upper cover assembly. (See Item 4.3.6.)

(2) Remove four installing screws ② and one installing screw ⑦ from control board ①.

(3) Move claws ③ and ④ outward, and lift control board ① about 10 mm.

(4) Using a screwdriver, move six claws ⑥ on operation panel ⑤ outward and remove operation panel ⑤ from control board ①.



4.3.9 Control board

(1) Remove five connectors ② connected to control board ①.

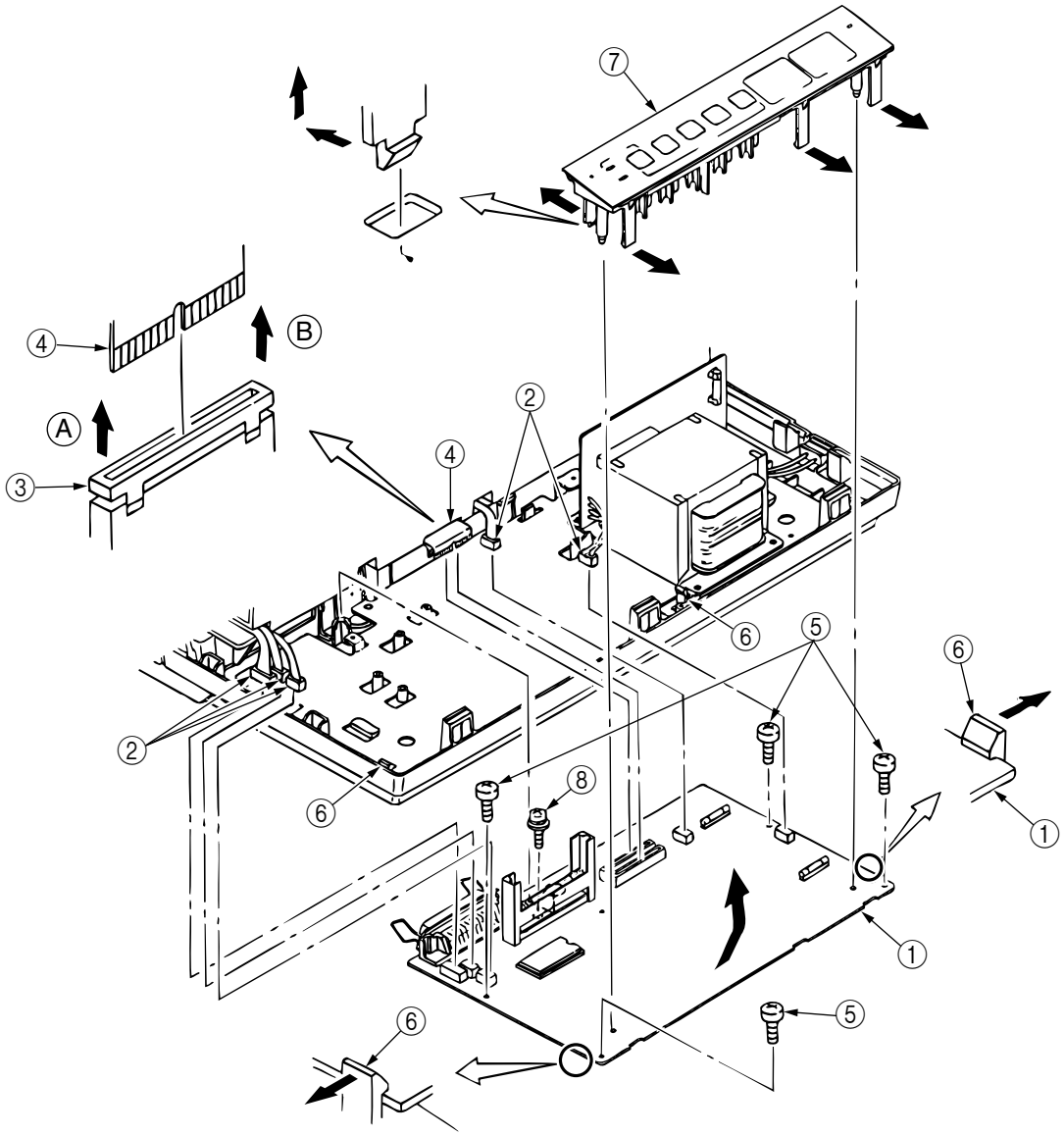
(2) Release cable clamp ③, and pull head cable ④.

(When head cable ④ is pulled out in the directions of arrows Ⓐ and Ⓑ, the cable is released and removed.)

(3) Remove four screws ⑤, and one screw ⑧.

(4) Move two claws ⑥ outward, and remove control board ① (in the direction of arrow Ⓒ).

(5) Remove operation panel ⑦. (See Item 4.3.8.)



4.3.10 LF motor

(1) Remove the upper cover assembly. (See Item 4.3.6.)

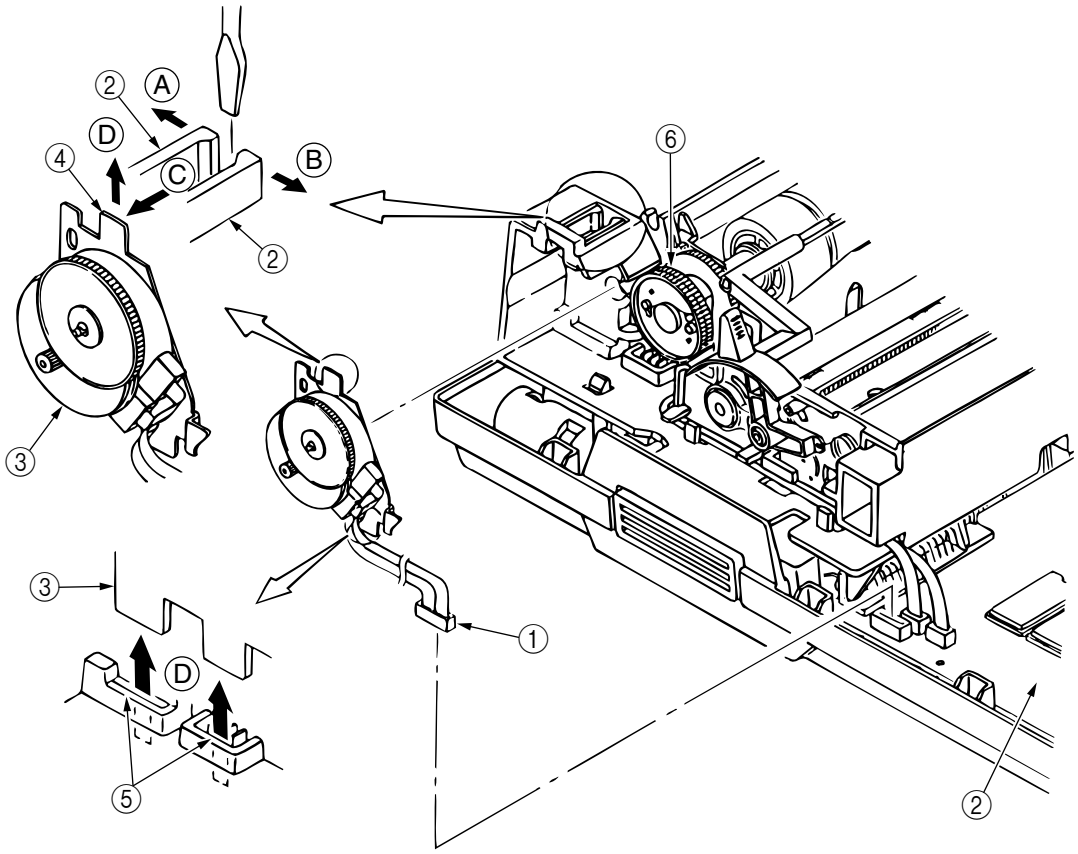
(2) Remove connector ① from control board ②.

(3) Open lock lever ② (in the directions of Ⓐ and Ⓑ), and push bracket ④ of LF motor ③ to the left (in the direction of Ⓒ).

(4) Pull LF motor ③ out of guide hole ⑤ (in the direction of Ⓓ).

(Note on installation)

1. After installation, check that platen gear ⑥ engages firmly and rotates smoothly.

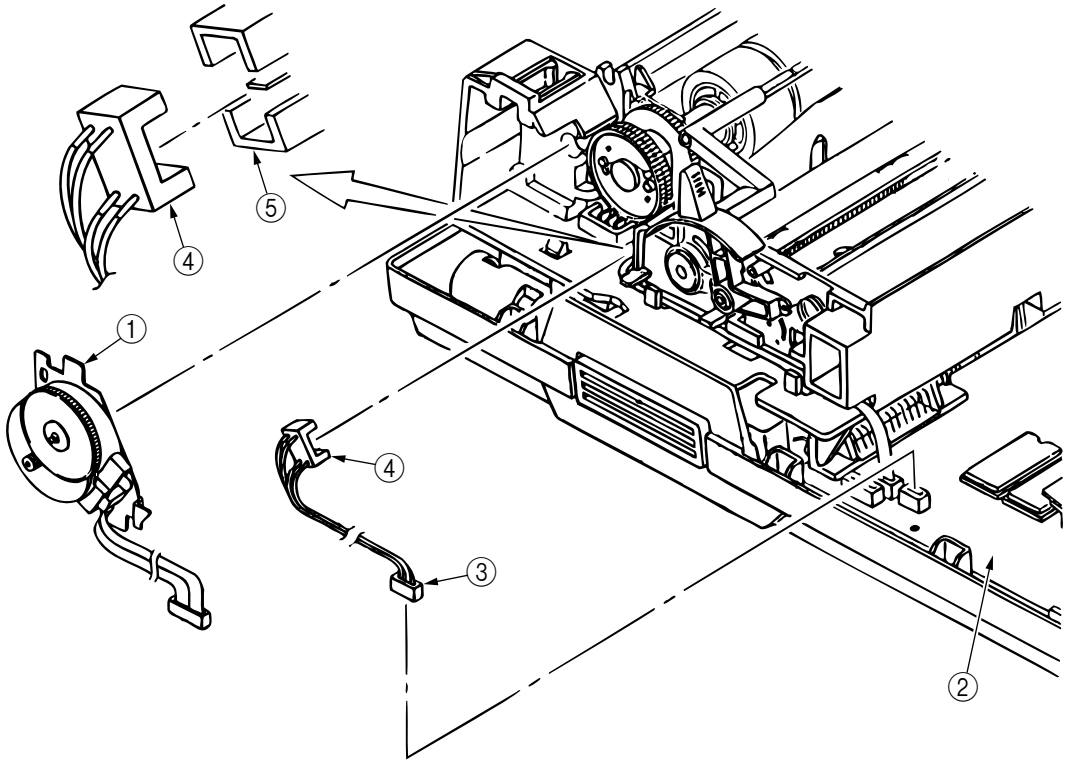


4.3.11 Paper end sensor

(1) Remove LF motor ①. (See Item 4.3.10.)
(Do not remove the LF motor cable.)

(2) Remove CN3 connector ③ from control board ②.

(3) Remove paper end sensor ④ from sensor guide ⑤.

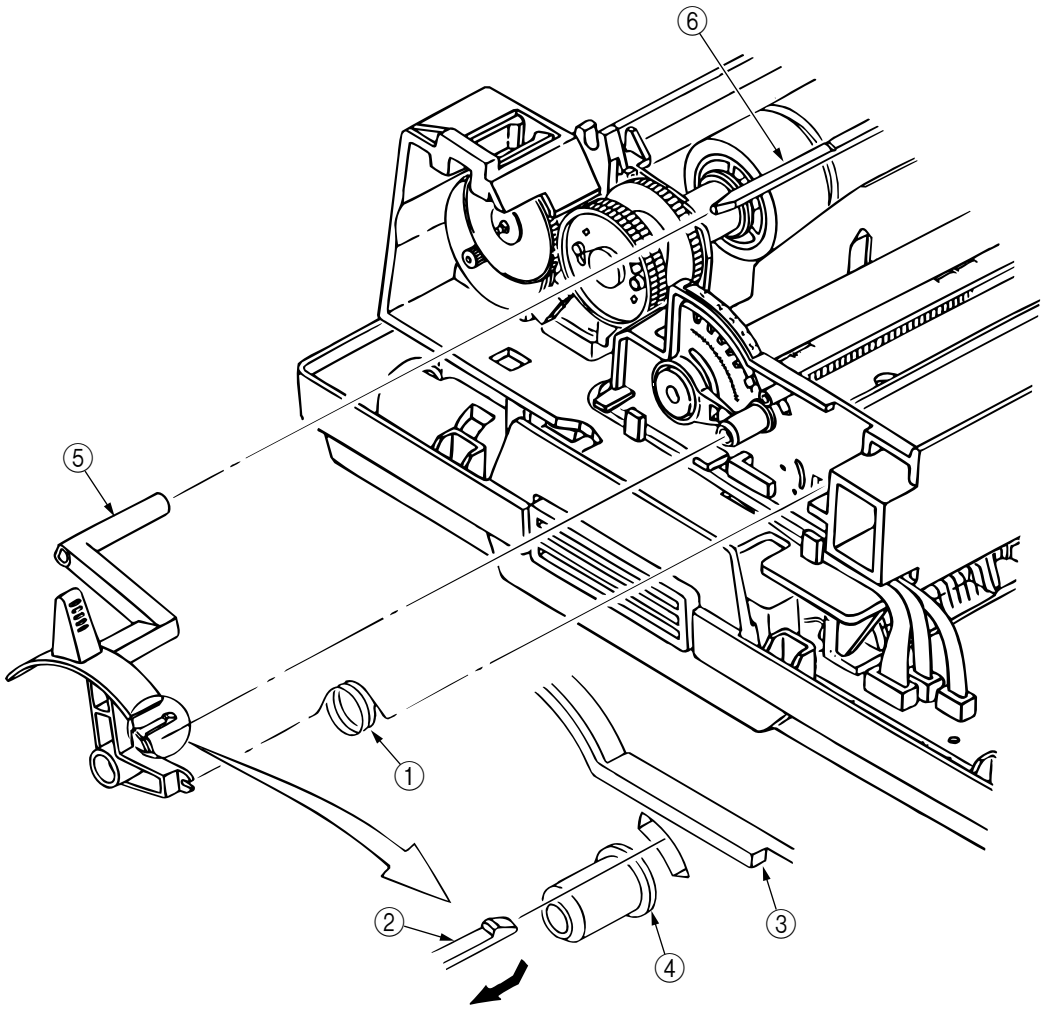


4.3.12 Bail arm (L)

(1) Remove the upper cover assembly. (See Item 4.3.6.)

(2) Remove bail arm spring (L) ① using pliers.

(3) Push claw ② downward, pull it out of guide hole ④ of main frame ③, and remove bail arm (L) ⑤. (Simultaneously, the bail arm (L) ⑤ can be removed from bail bar ⑥.)



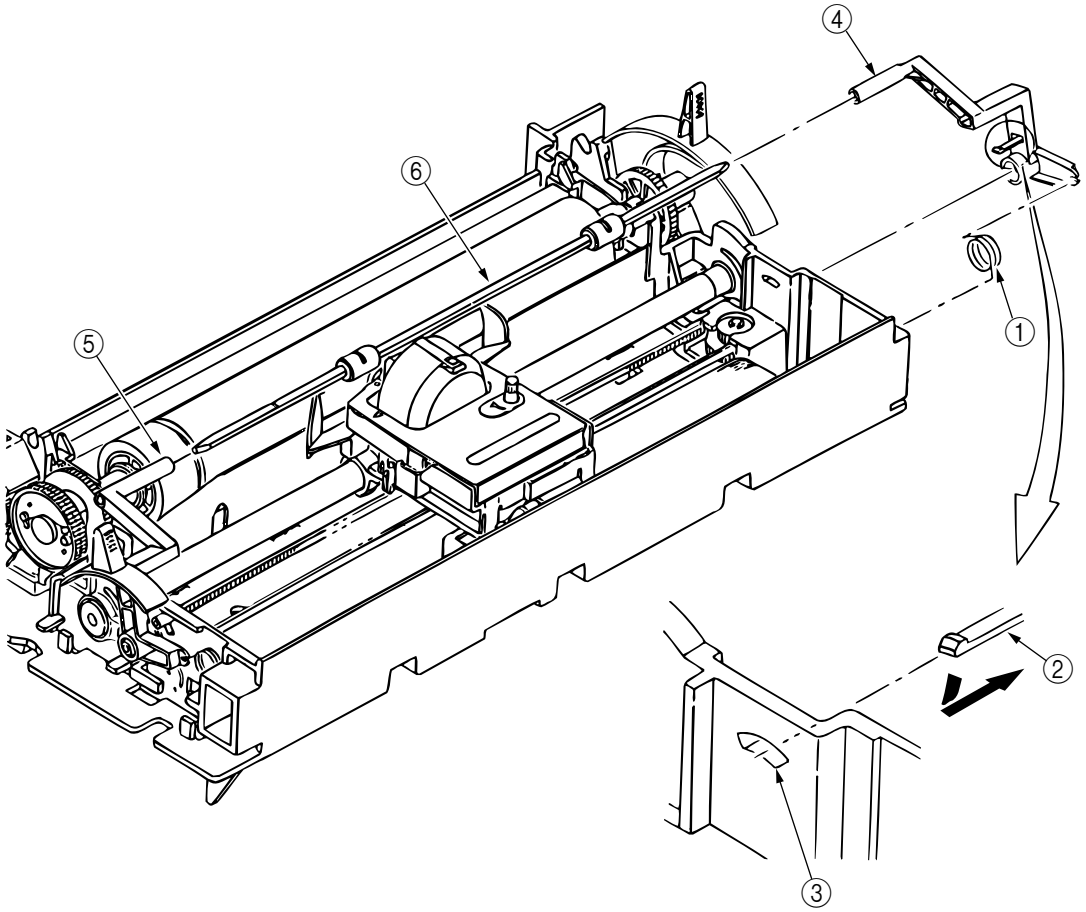
4.3.13 Bail bar

(1) Remove the upper cover assembly. (See Item 4.3.6.)

(2) Remove bail arm spring (R) ① using pliers.

(3) Push claw ② downward, pull it out of guide hole ③ of the main frame, then remove bail arm (R) ④.

(4) Pull bail bar ⑥ out of bail arm (L) ⑤.



4.3.14 Carriage frame

(1) Remove the printhead. (See Item 4.3.2.)

(2) Remove the upper cover assembly. (See Item 4.3.6.)

(3) Remove two mounting screws ② from carriage plate ①. (The ribbon feed gear assembly remains attached.)

(4) Open supporting point Ⓐ, and remove head clamp ③.

(5) Insert the screwdriver into the groove of carriage frame ④, and remove ribbon protector ⑤ to release the frame.

(6) Remove ground cord ⑫ from the left side of carriage shift.

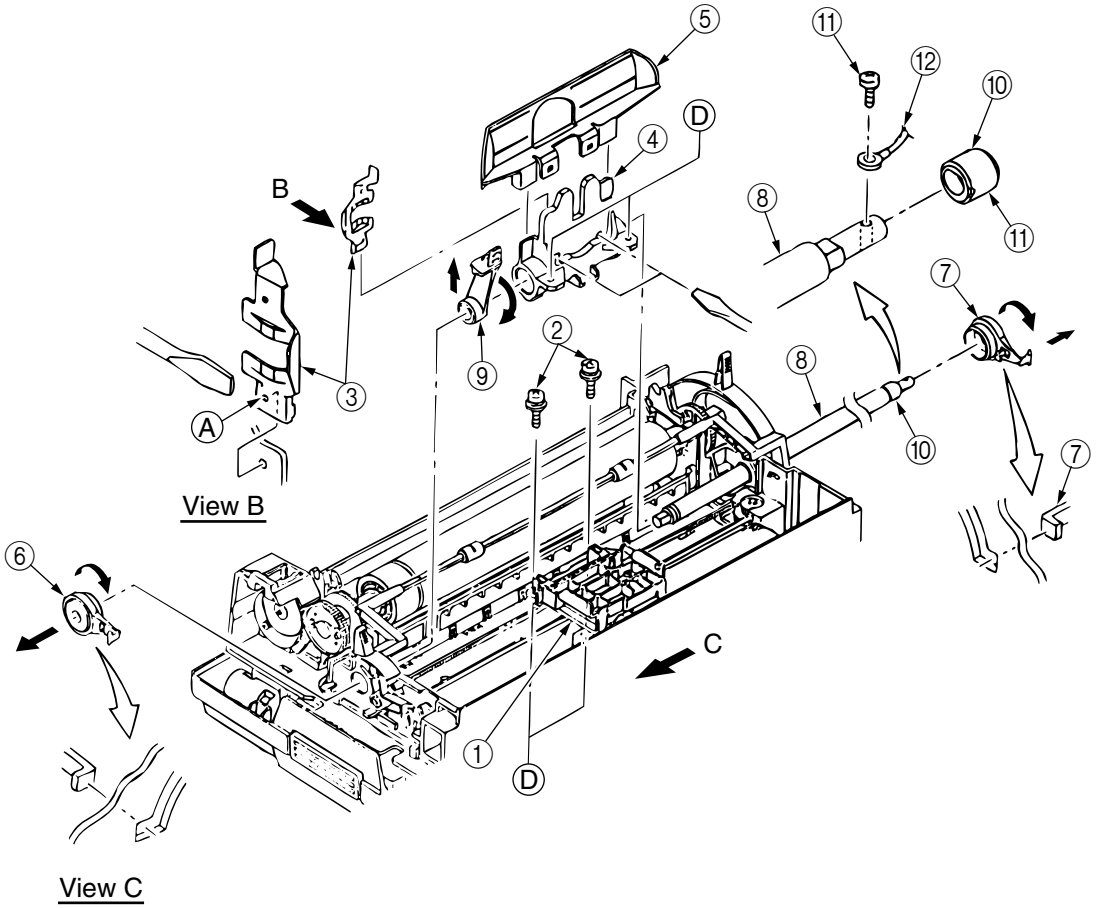
(7) Turn adjust bush (L) (White) ⑥ to the lower end, and remove it on the left.

(8) Turn adjust bush (R) (black) ⑦ to the lower end, and remove it on the right.

(9) Slide carriage shaft ⑧ to the right, while lifting adjusting lever ⑨, and remove the shaft from adjusting lever ⑨.

(10) Pull carriage shaft ⑧ to the right, and remove carriage frame ④. At this time, be careful not to lose the eccentric collar ⑩.

When the eccentric collar ⑩ is removed, install notching section ⑪ to carriage shaft ⑧.



4.3.15 Platen assembly

(1) Remove the upper cover assembly. (See Item 4.3.6.)

(2) Pull bail arm (L) ① and release lever ②.

(3) Pull lock levers ③ and ④ in the direction of the arrow ⓐ, raising them at an angle of 90˚.

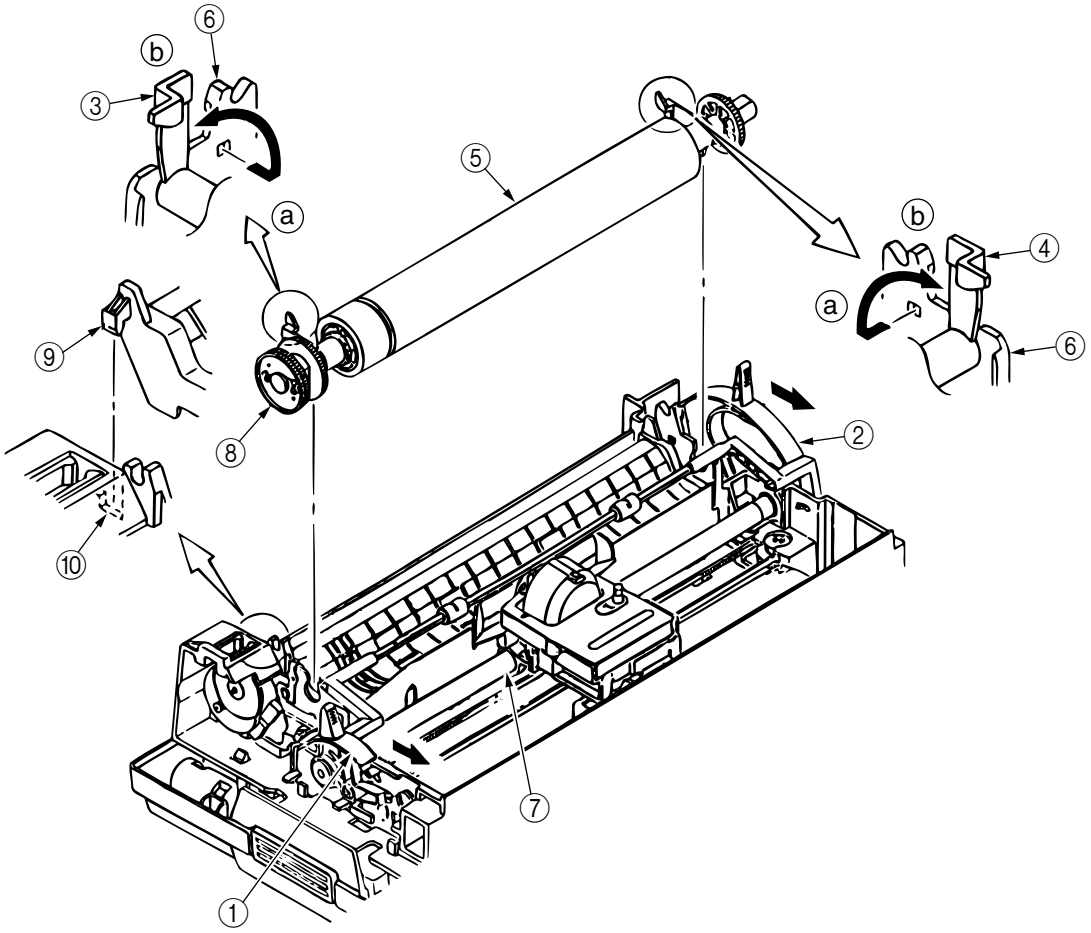
(This allows platen assembly ⑤ to release from main frame ⑥.)

(4) Shift carriage frame ⑦ to the right, lift the left part of platen assembly ⑤, and return the carriage frame to the left.

(5) Remove the right part of platen assembly ⑤ from main frame ⑥.

(Notes on installation)

1. After installation, check that platen gear ⑧ engages firmly with the LF motor gear and that the platen rotates smoothly.
2. Set release lever ② to the OPEN side (front) and check that groove ⑨ positioning the paper chute firmly engages with groove ⑩ of the main frame. After that, lock the platen assembly.



4.3.16 Pressure roller assembly

(1) Remove the platen assembly. (See Item 4.3.15.)

(2) Remove paper chute ①.

(3) Open claw ②, and remove release lever ③.

(4) Remove change gear ④.

At this time, be careful not to lose spring ⑮ equipped on the same shaft.

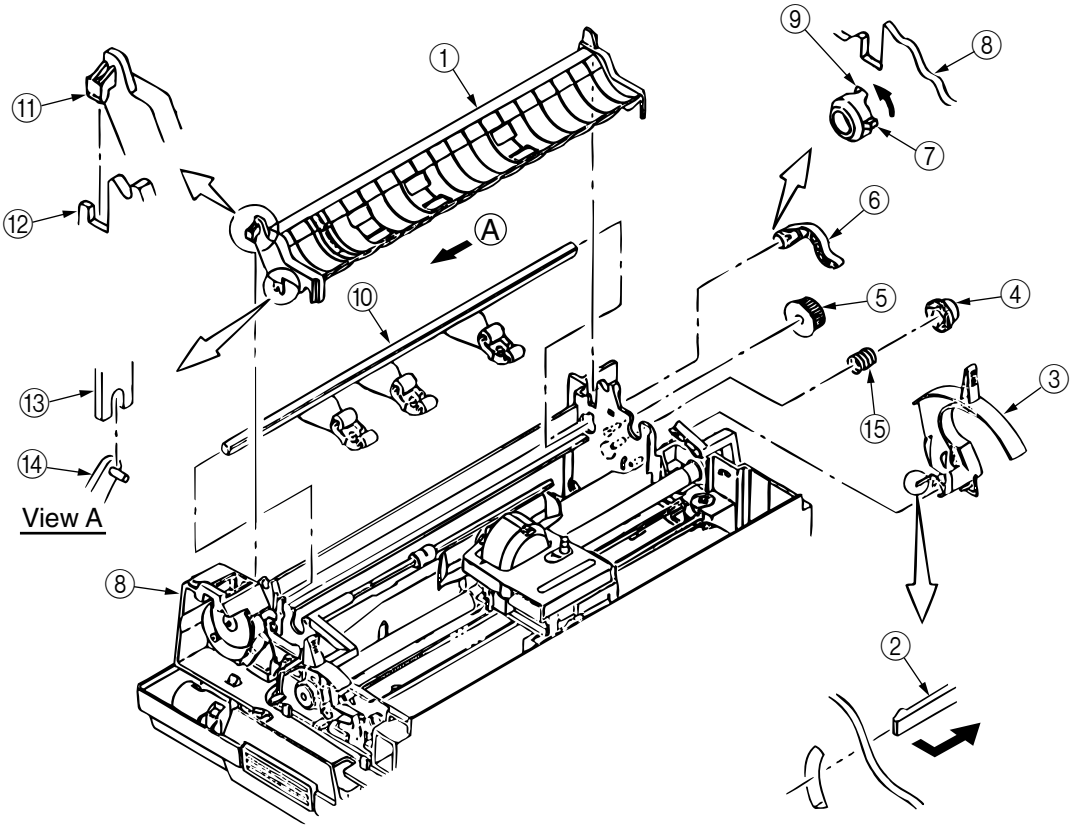
(5) Remove idle gear ⑤.

(6) Remove boss ⑦ from guide hole ⑨ of main frame ⑧, and remove release link ⑥.

(7) Pull the left part of pressure roller assembly ⑩ shaft out of main frame ⑧ to the right. Next, pull the pressure roller assembly shaft out of the right main frame to the left, and remove the shaft.

(Notes on installation)

1. After positioning groove ⑪ of the paper chute firmly with tab ⑫ of the main frame, attach the platen assembly.
2. Connect cut-sheet end lever ⑬ attached to the paper chute to the bottom paper end lever ⑭ under the main frame, and install the paper chute ①.



4.3.17 Paper pressure guide

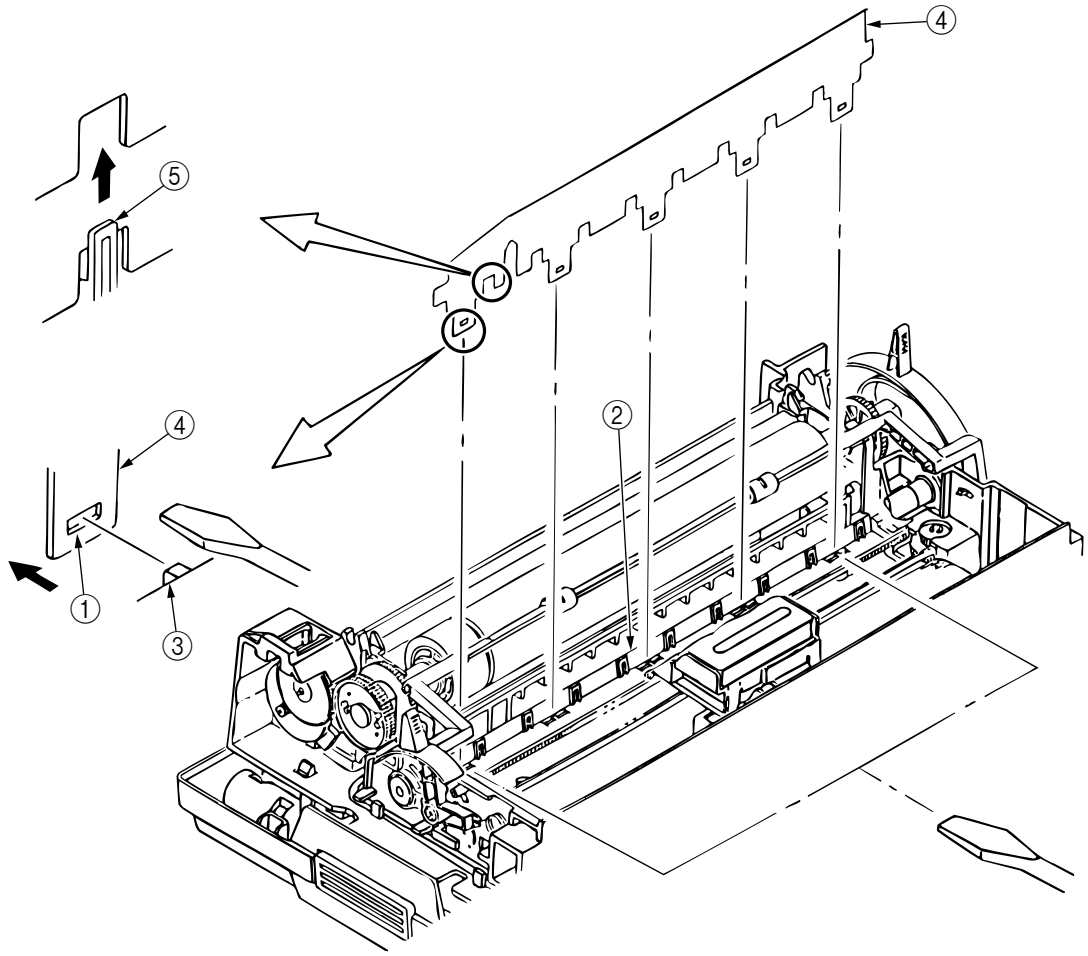
(1) Remove the platen assembly. (See Item 4.3.15.)

(2) Remove connection hole section ① from projection ③ of main frame ② using the screw-driver.

Remove paper pressure guide ④ by removing the connection holes in left-to-right order.

(Note on installation)

1. Be sure to install projection ③ and guide plate ⑤ simultaneously.



4.3.18 Ribbon protector

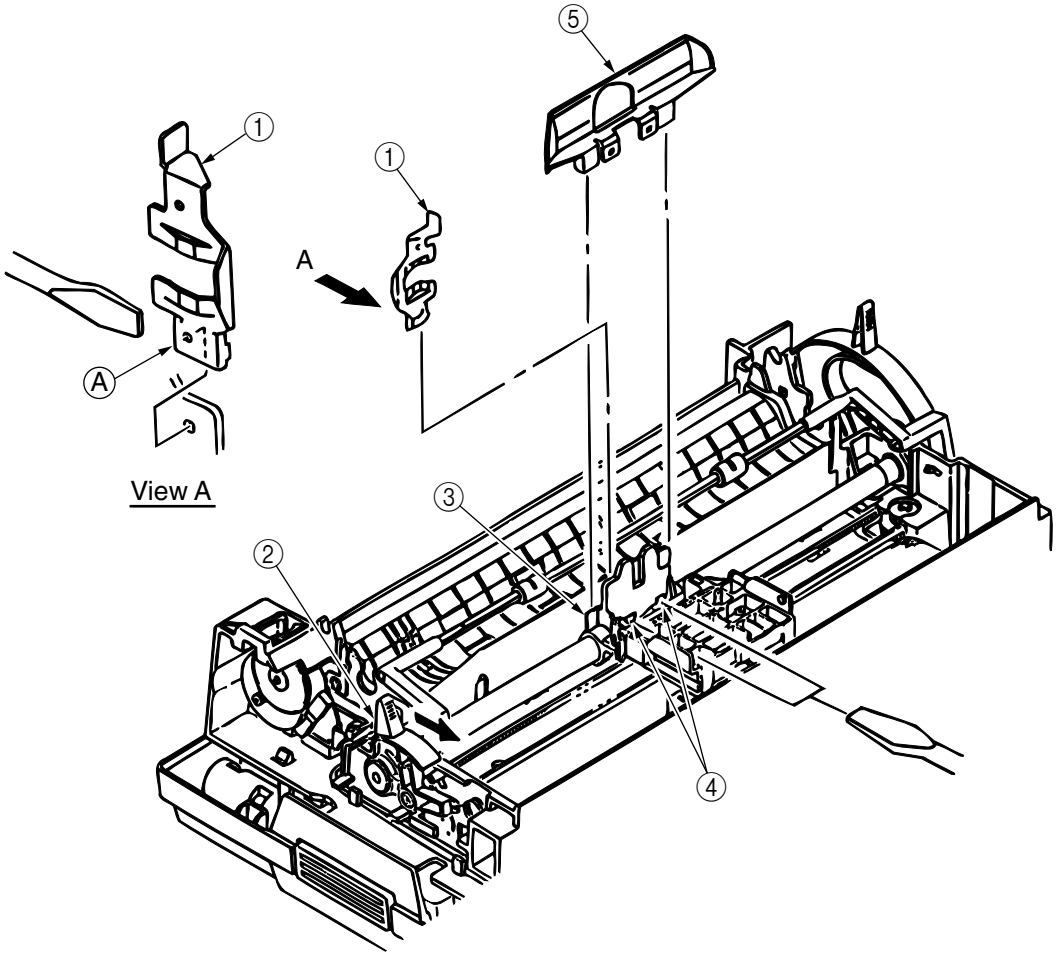
(1) Remove the printhead. (See Item 4.3.2.)

(2) Remove tee platen assembly. (See Item 4.3.15.)

(3) Open supporting point Ⓐ, and remove head clamp ①.

(4) Pull bail lever ②.

(5) Insert the screwdriver into groove ④ of carriage frame ③, and remove ribbon protector ⑤ from carriage frame ③.



4.3.19 Tractor assembly

(1) Remove the upper cover. (See Item 4.3.6.)

(2) Remove release lever ①.

(3) Remove change gear ②. At this time, be careful not to lose the spring ㉔, equipped with the same shaft.

(4) Open claw ③, remove drive gear ⑥ half from groove ⑤ of drive shaft ④.

(5) Move the right groove ⑦ of drive shaft ④ from guide ⑧ of the main frame, shift the groove to the right (Arrows Ⓐ and Ⓑ), and remove the left part of the drive shaft from guide hole ⑨ of the main frame.

(6) Push the left part of lock shaft ⑩, and move groove ⑪ of lock shaft ⑩ from main frame hole (Arrow Ⓒ). Shift lock shaft ⑩ to the right, and remove the shaft from the larger guide hole (Arrow Ⓓ).

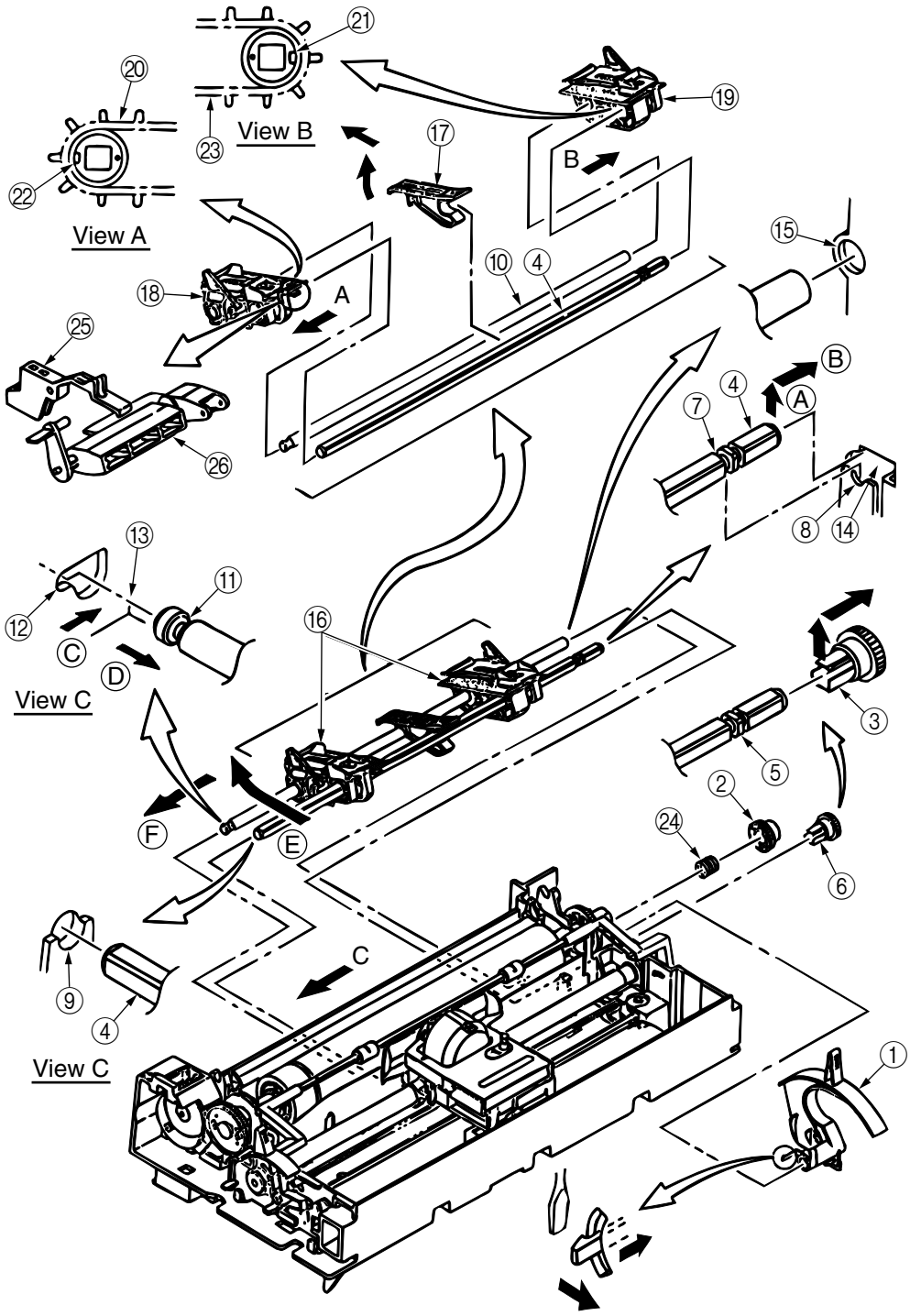
(7) Remove drive gear ⑥ from drive shaft ④ completely.

(8) Push the left part of the tractor assembly (Arrow Ⓔ), and remove tractor assembly ⑯ while pulling drive shaft ④ out of guide holes ⑭ and ⑮ of the printer frame. (Arrow Ⓕ)

(9) Remove center guide ⑰, pin tractor assembly (L) ⑱ and pin tractor assembly (R) ⑲ from two shafts ④ and ⑩.

(Note on installation)

1. Positioning mark A ㉒ of pin tractor (L) ⑳ is shown in view A, and positioning mark B ㉑ of (R) ㉓ is shown in View B. These positioning marks are incorporated into drive shaft ④.
2. Install pin tractor assembly (L) ⑱ at the left side (LF motor side) of the printer mechanism with stopper.
3. Install continuous paper end lever ㉕ with pin tractor assembly (L) ⑱ on bottom paper end lever ㉖.


21
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View A
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8
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13
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12
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16
View C
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5
2
24
F
E
6
C
9
4
View C
1

4.3.20 Microswitch assembly

(1) Remove the upper cover. (See Item 4.3.6.)

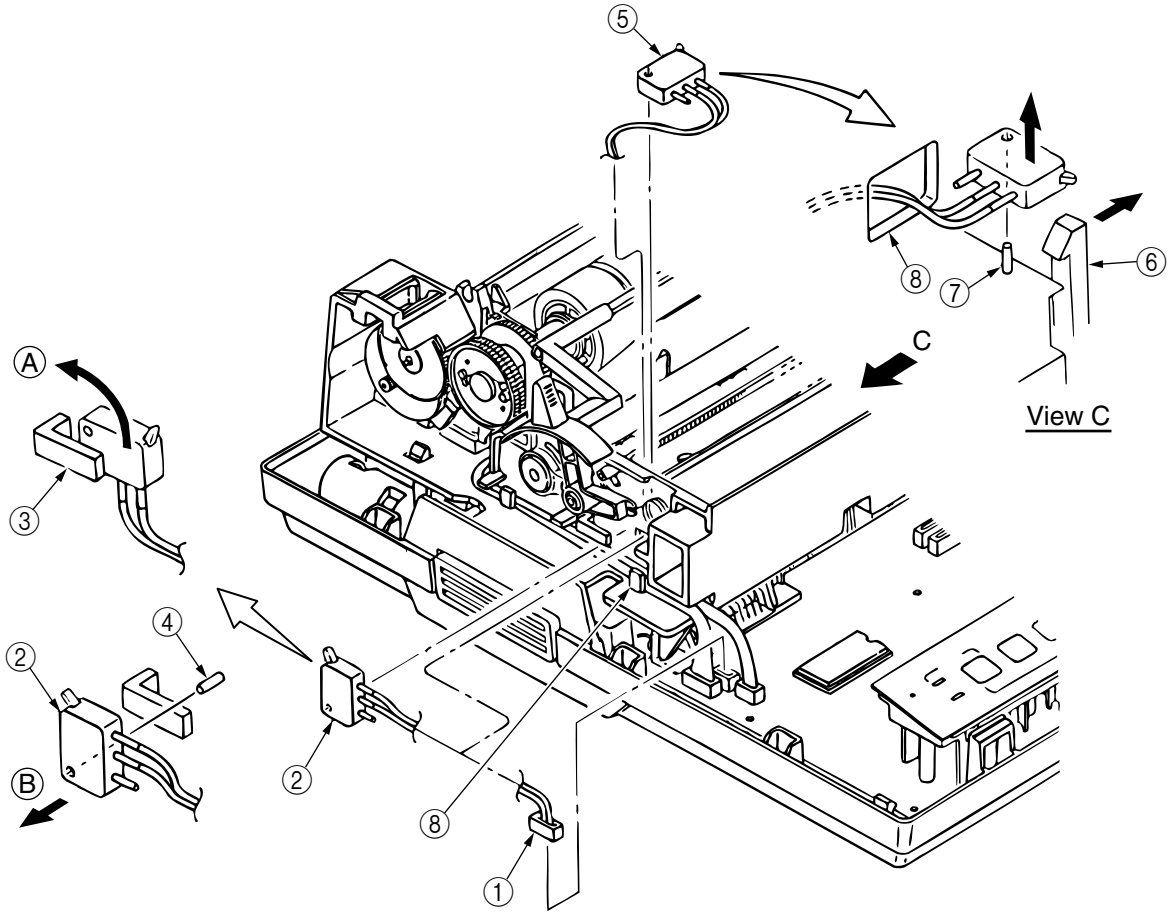
(2) Remove cord ① from the control board.

(3) Remove SASF switch ②.

- Turn SASF switch counter-clockwise (arrow Ⓐ), and remove the switch from guide ③. Pull the switch to the left (Arrow Ⓑ), and remove it from pin ④.

(4) Remove home position switch ⑤.

- Open switch keep ⑥, and remove home position switch ⑤ from pin ⑦.
- Pull removed home position switch ⑤ out through hole ⑧ of the printer frame.



4.3.21 Printer mechanism

(1) Remove the upper cover assembly. (See Item 4.3.6.)

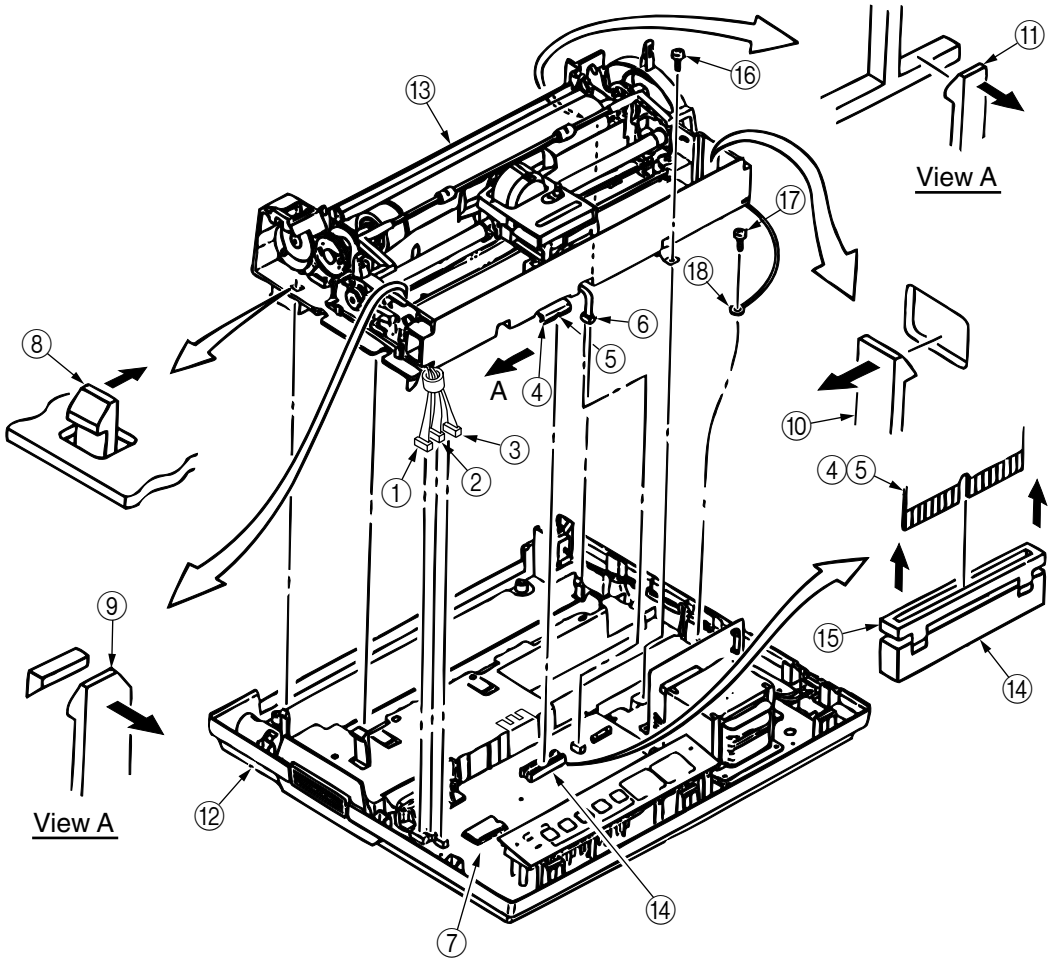
(2) Remove cord ①, ②, ③, ④, ⑤, and ⑥ from the control board ⑦. (Cord ④ and ⑤ can be removed by pulling cable clamp ⑮.)

(3) Remove two screws ⑯, ⑰, and remove grounding cord ⑱.

(4) Open claws ⑧, ⑨, ⑩, and ⑪ in lower cover assembly ⑫, and lift printer mechanism ⑬ out.

(Note on installation)

1. Cord ② is a yellow connector (4 pins) and cord ③ is a white connector (4 pins). So, these connectors must be installed to the same color connectors on control board ⑦.



4.3.22 Power supply unit

⚠Warning	Risk of Electric Shock	

There is a risk of electric shock during replacement of the power supply.

Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cable is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

(1) Remove the printer mechanism. (See Item 4.3.21.)

(2) Remove connector ② from control board ①.

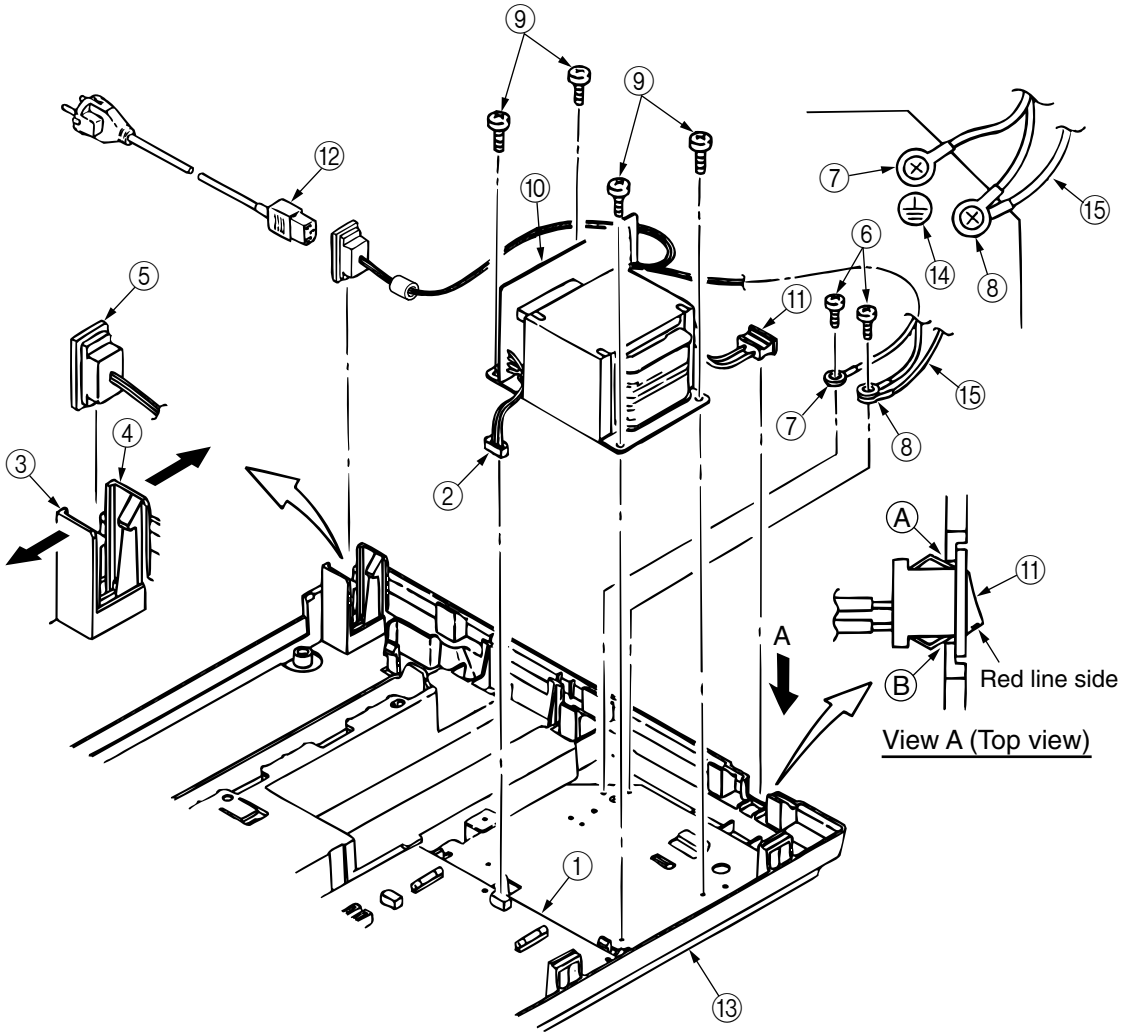
(3) Open claws ③ and ④, and remove cord bushing ⑤.

(4) Remove two screws ⑥, and remove grounding cords ⑦ and ⑧ and ⑮.

(5) Remove four screws ⑨, and remove transformer ⑩, AC switch ⑪, and AC cord ⑫ from lower cover assembly ⑪. (The power supply unit consists of ②, ⑦, ⑧, ⑩, ⑪, and ⑫.)

(Notes on installation)

1. Firmly insert AC switch ⑪ into guides Ⓐ and Ⓑ of lower cover ⑬, and install them, taking care of the direction for installation. (The side with the red line is the front.)
2. Install grounding cords ⑦ and ⑧ as shown below, being careful not to cover safety grounding mark ⑭. (The cord ⑦ indicates a grounding wire from the AC cord, and the cord ⑧ indicates a grounding wire from the power board.)



4.3.23 Space motor

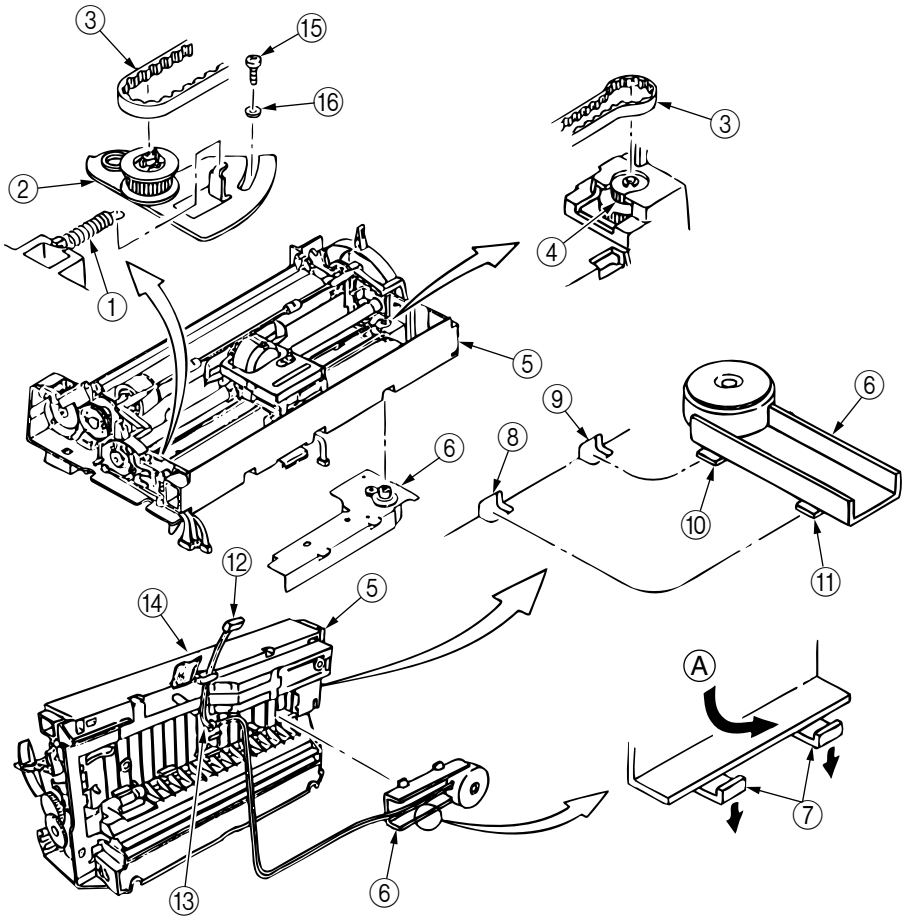
(1) Remove the printer mechanism. (See Item 4.3.21.)

(2) Remove self tapping screw ⑮, washer ⑯, belt tension spring ①, and remove belt ③ from idle pulley ②.

(3) Remove space belt ③ from drive gear ④ of space motor.

(4) Raise printer mechanism ⑤, and remove connector ⑫ from guides ⑬ and ⑭.

(5) Open two claws ⑦, and pull space motor assembly ⑥ in the direction of the arrow Ⓐ. Remove brackets ⑩ and ⑪ from guide holes ⑧ and ⑨ of the main frame, and remove space motor ⑥.



Bottom view

4.3.24 Bottom paper end lever

(1) Remove the printer mechanism. (See Item 4.3.21.)

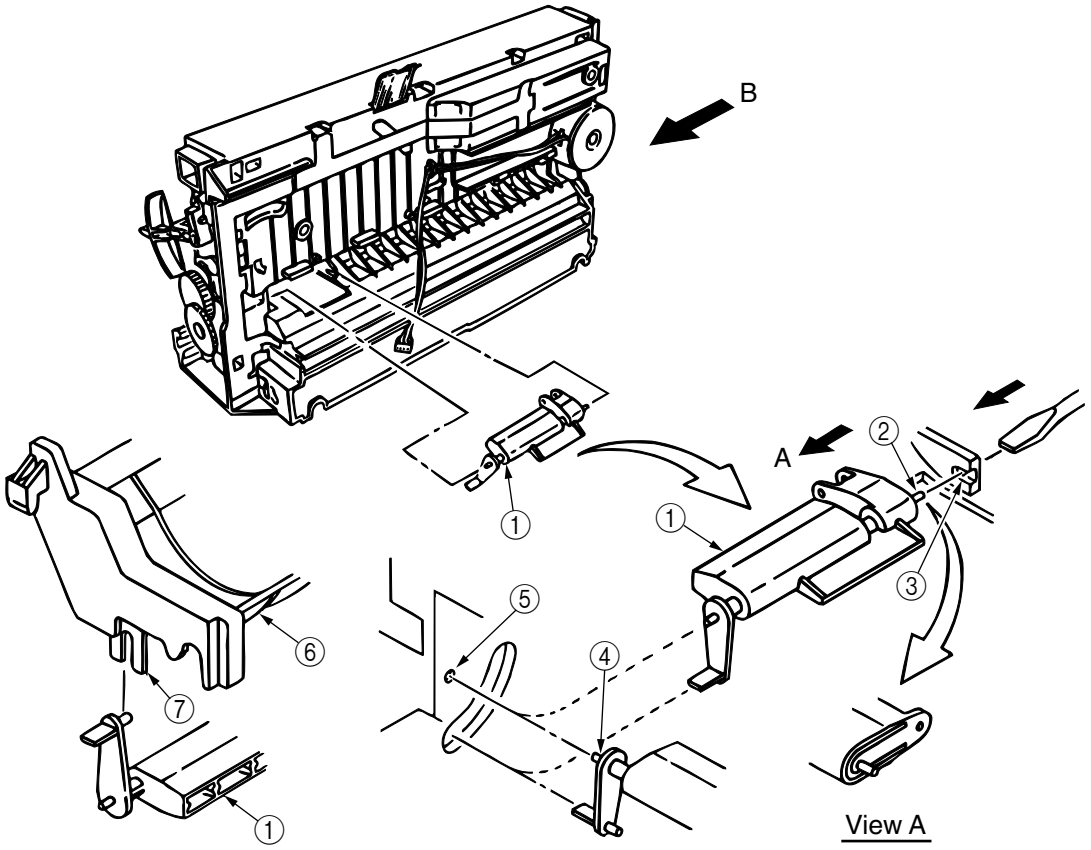
(2) Remove the paper chute. (See Item 4.3.16.)

(3) Push pin ② of bottom paper end lever ①, and remove pin ② from guide hole ③ of the main frame.

(4) Remove pin ④ from guide hole ⑤ of the main frame, and remove bottom paper end lever ①.

(Note on installation)

1. When paper chute ⑥ is installed, cut-sheet paper end lever ⑦ must engage firmly with bottom paper end lever ①.



5. ADJUSTMENT

5.1 Gap Between The Platen And Printhead

(1) Adjustment value : 0.016 ± 0.002 inch (0.41 ± 0.05 mm) (range 1 position)

(2) Adjustment position : Perform on the left, center and right end of the platen.

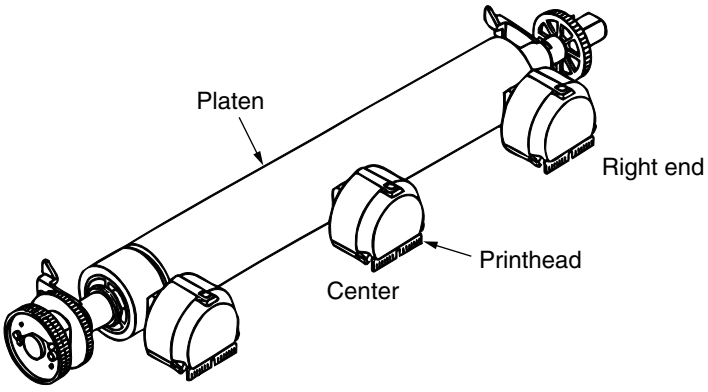
(3) Adjustment method

a) Move the release lever to the open position (Front).

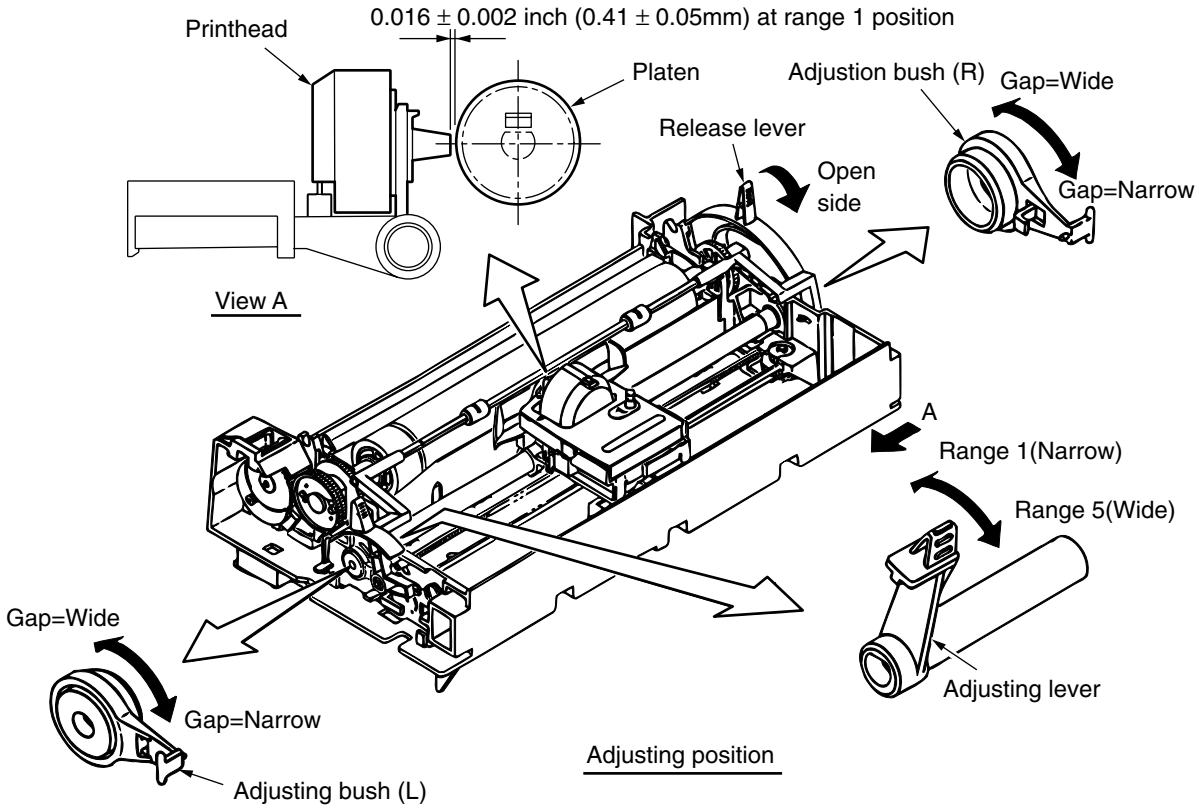
b) After setting the adjusting level to range 1, rotate the right and left adjusting bushed to obtain the correct gap 0.016 ± 0.002 inch (0.41 ± 0.05 mm) between the platen and the printhead.

Be sure to measure the gap of the printhead at the right /left ends and the center of the platen.

c) Make sure that the gap is 0.027 ± 0.002 inch (0.69 ± 0.05 mm) with the adjusting lever at range 5.



Measuring position



Adjusting position

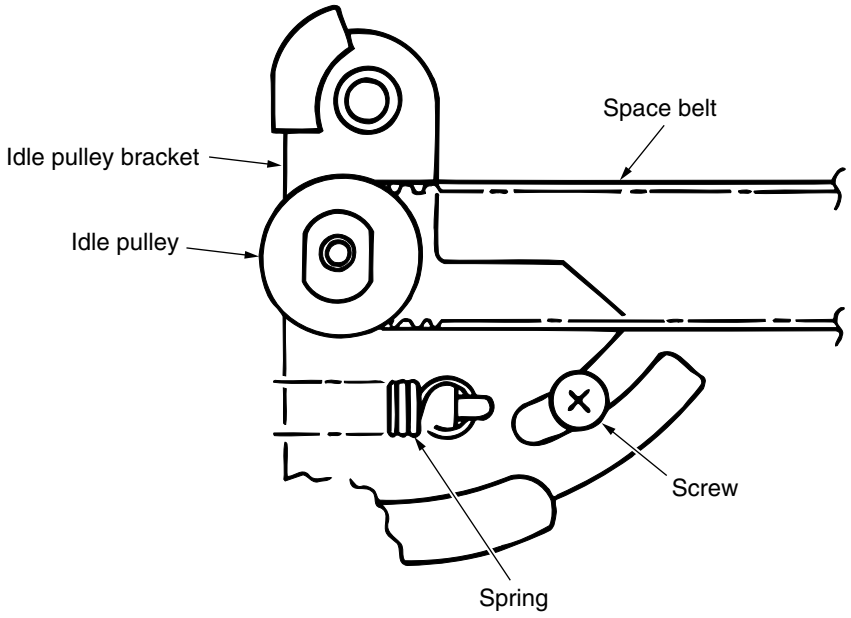
5.2 Space Belt Tension

(1) Adjustment method

a) Slightly loosen screw of idle pulley (do not remove).

b) Re-fasten screw of idle pulley.

The above procedure allows the space belt to be adjusted to an appropriate tension supported by the spring.



6. CLEANING AND LUBRICATION

6.1 Cleaning

[Note] Before attempting to clean the printer, turn off the POWER switch.

Clean the inside of the printer periodically according to the following items.

Cleaning period : Every 6 months or 300 hours of operation, whichever comes first

Required time : About 10 min.

Tools to be used : Dry soft cloth (Such as gauze, etc.), and vacuum cleaner (preferable)

Cleaning area : in accordance with Table 6-1

Table 6-1 Areas to be cleaned

Area to be cleaned	Contents of cleaning
Carriage shaft and its vicinity	Remove or vacuum out the paper particles and wipe out dirt, dust and ribbon waste, etc.
Paper feed, pin surface	Clean the pin roller part of platen.
Paper end sensor	Wipe or vacuum out the dust which has stuck to the sensors.

6.2 Lubrication

(1) Lubricant

1) Alvania grease #2EP (or equivalent) ..... GEP

2) Pan motor oil (or equivalent) ..... PM

(2) Amount of lubricant

1) ordinary.....Ⓐ: About 3 to 4 drops oil or 0.008 inch (0.2 mm) thick grease

2) small amount.....Ⓑ: About one drop of oil (0.006 ± 0.002g)

(3) Period of lubricant

This equipment is designed to be maintenance-free and oiling is unnecessary during operation.

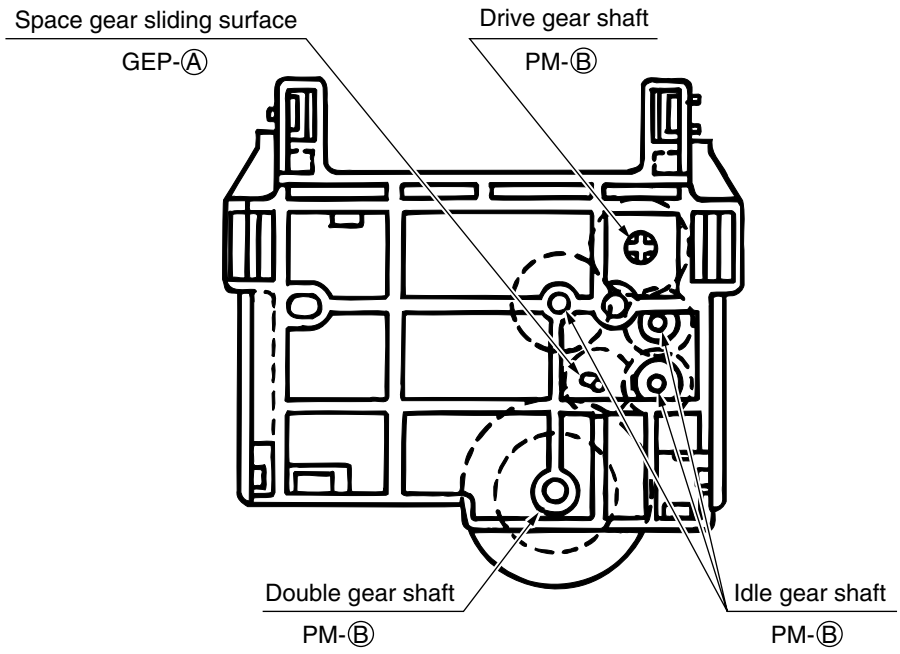
However, when reassembly or cleaning of oiled parts occurs, lubricant is required.

(4) Areas to avoid contact with lubricant

Item No.	Areas to avoid lubricant	Reason	Remarks
1	Platen surface	To prevent stained paper	
2	Pressure roller surface	To prevent stained paper and poor paper feeding	The roller surface should be free of oil because grease is applied to the pivotal part of the pressure roller.
3	Pressure roller for bail bar	To prevent stained paper and poor paper feeding	
4	Ink ribbon	To prevent poor printing	
5	Pin tractor	To prevent stained paper	
6	Flexible head cable	To prevent poor electrical contact and cable cracking	
7	Space belt	To prevent rubber deterioration/looseness	
8	Microswitch	Protect contact	

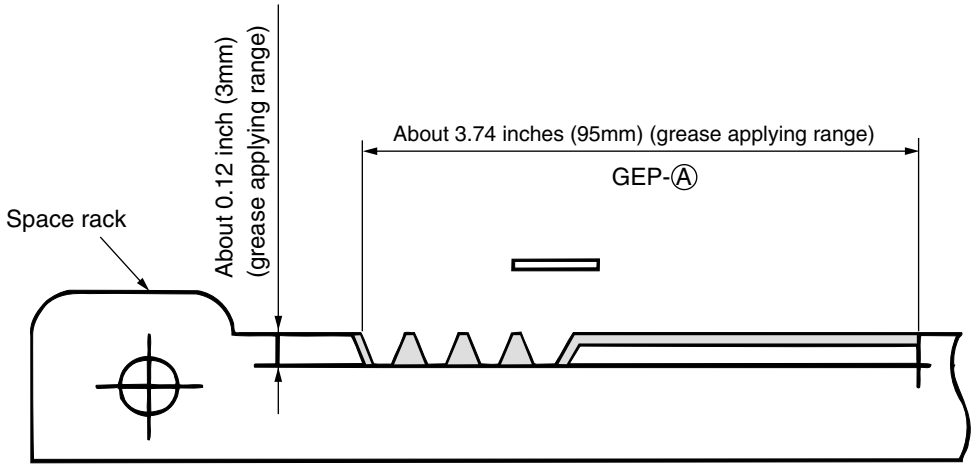
(5) Lubrication points

a) Ribbon feed gear assembly



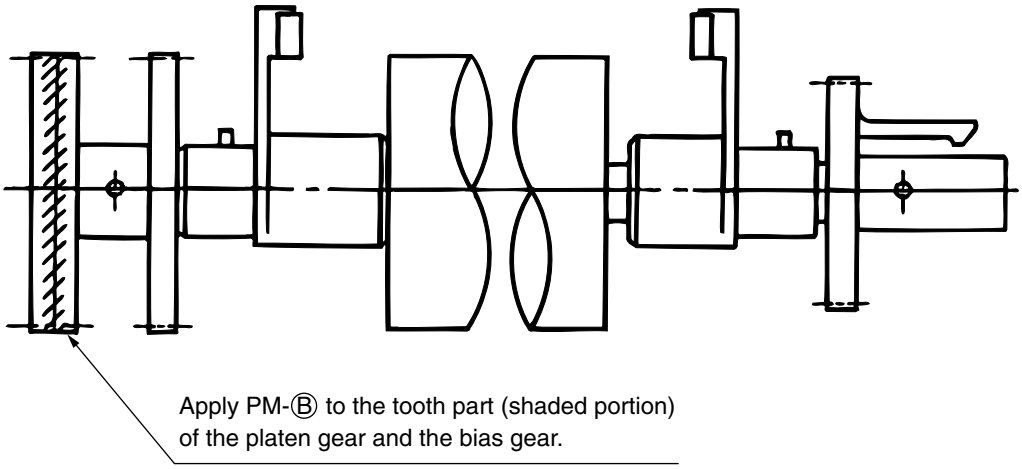
Note 1 : Pan motor oil is applied to the upper and lowser sections of gear by the use of an oil dispenser. (Ten positions for each section)

b) Space rack

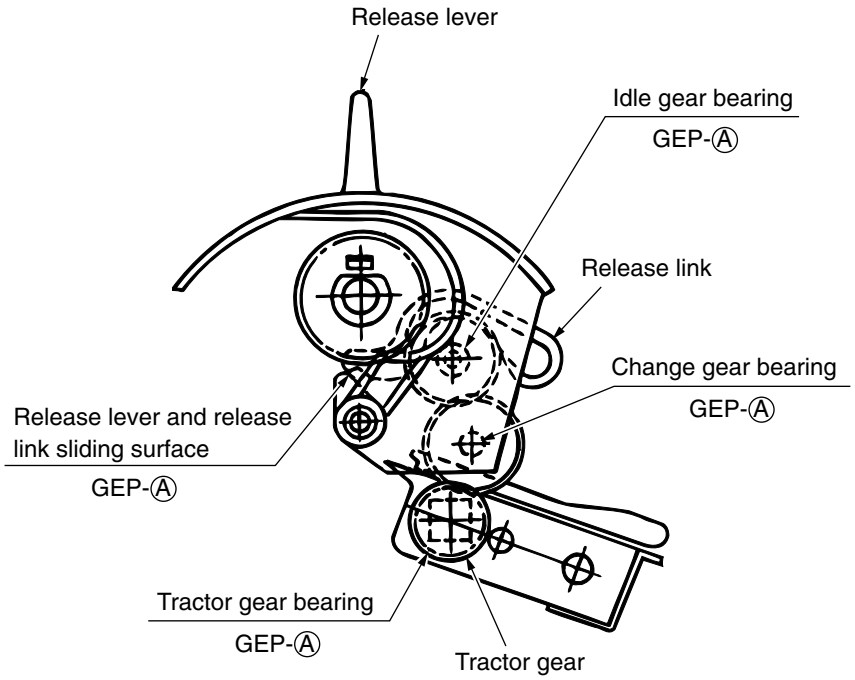


Note 1 : Grease must be applied to an area of about 3.74 inches (95 mm) from the left end of the tooth part (shaded portion) covering the edge about 0.12 inch (3 mm) from the space rack top surface.

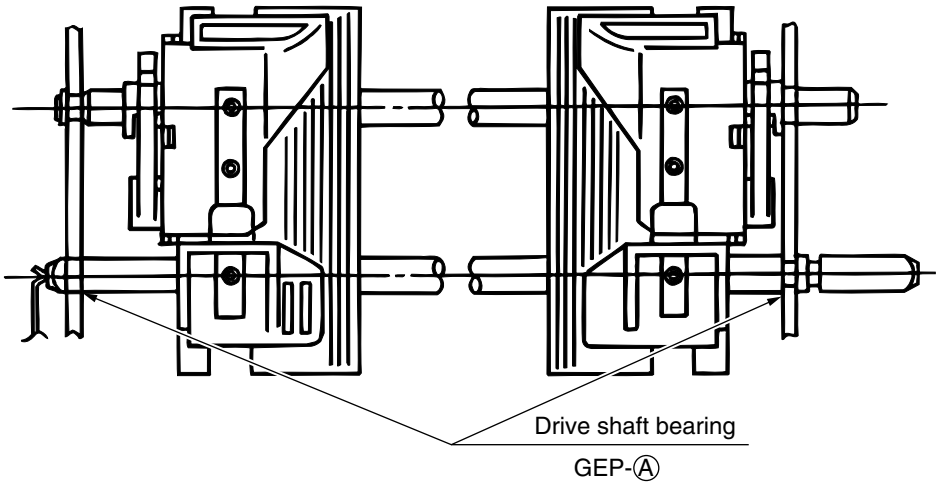
c) Platen assembly



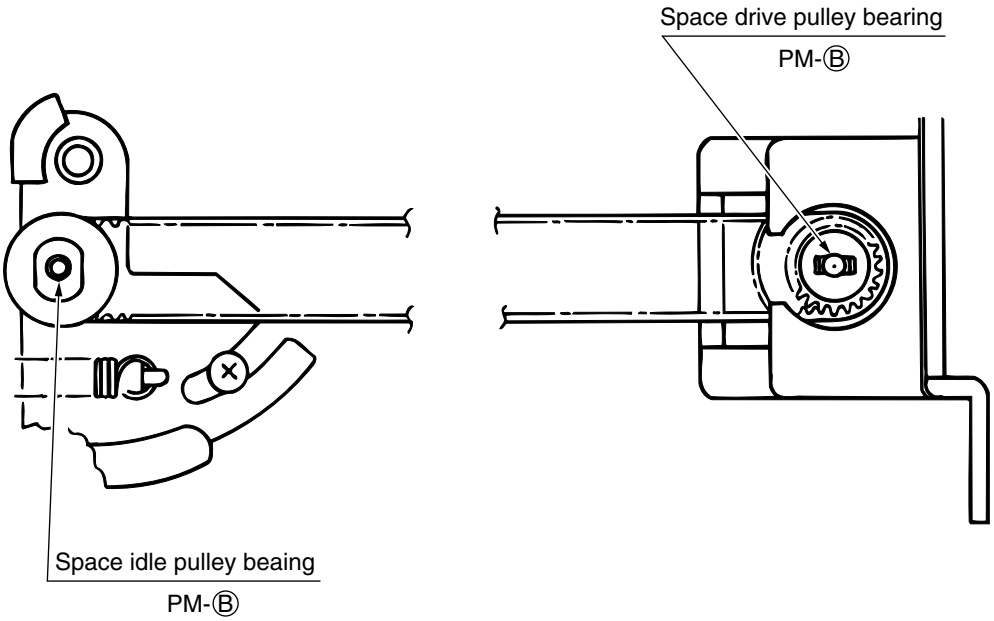
d) Tractor driving system



e) Tractor drive shaft



f) Space drive pulley and space idle pulley



7. TROUBLESHOOTING AND REPAIR

7.1 Items to Check before Repair

Before servicing the printer, as the customer if possible under what conditions the trouble occurred, and record the customer's responses.

Before troubleshooting, set up the printer to operate under the same conditions as at the time the trouble occurred and check whether the trouble is reproducible. If the trouble is not reproducible, perform the printer's self test and thoroughly test the printers functionality. If the trouble is reproducible proceed to the troubleshooting section.

7.2 Method of Troubleshooting

Verify the problem and then locate the trouble in accordance with the detailed procedure given for each item on table 7-1.

Before correcting the problem, thoroughly read the precautions in Section 4.1.

The checkpoints for the UMMB board is shown in Figure 7-1. The connector locations and pin numbers are shown in Figure 7-2. The block diagram is shown in Figure 7-3.

Table 7-1

Status	Details	Flowchart item No.
Trouble upon power-on	• Power is not supplied.	①
	• Spacing operation does not operate normally.	②
Trouble during printing operation	• Wrong character, character or dot omission	③
	• Line feed trouble	④
	• Data receiving failure	⑤

7.3 Lamp Display

(1) Printer mode display

(2) Fault alarm display

When the printer detects a variety of alarm conditions, these alarm conditions are displayed using LEDs. Alarm condition status is displayed by the different MODE LEDs which are lit along with the POW LED and the flashing SELECT LED.

The details are listed below.

Table 7-2

Printer mode		SEL	Contents	Remarks
Normal operation	ON LINE mode	ON	Indicates that the printer is ready to receive data and print.	
	HEX DUMP mode		Indicates that the printer is in hex dump mode.	
	Print suppress		Indicates that the printer is in the print suppress mode.	
	Self-test mode	OFF	Indicates that the printer is in local mode.	
	MENU mode		Indicates that the printer is in menu mode.	
Operator alarm condition	Paper end	BLINK *1	Form end, single sheet end, or bottom paper end.	
	Paper jam		SASF paper jam	
	CSF paper jam		Paper jam or paper end, when CSF is installed.	
Internal fault alarm condition		BLINK *2		

*1 Blinking cycle: 500ms

*2 Blinking cycle: 100ms

Table 7-3

Error condition	Lit mode LED besides POW and flashing SELECT LED	Contents
Memory error	COURIER, 10	MPU internal RAM error
	ORATOR, 10	Program ROM error
	ORATOR, 20	EEPROM error
	HELVETTE, 10	External RAM error
	ORATOR, 15	Resident CG ROM error
	ORATOR, HELVETTE, 10	Resident CG release
	HEVETTE, 20, 15	RAM card error
Font card error	ORATOR, 20, 15	Font card error
	ORATOR, HEVETTE, 20, 15	Font card release
Spacing error	COURIER, ORATOR, 10	Head homing error
	COURIER, ORATOR, 20	Spacing error
Printhead error	COURIER, ORATOR, 15	Thermistor open error
Serial interface error	COURIER, 20	Serial interface ROM/RAM error

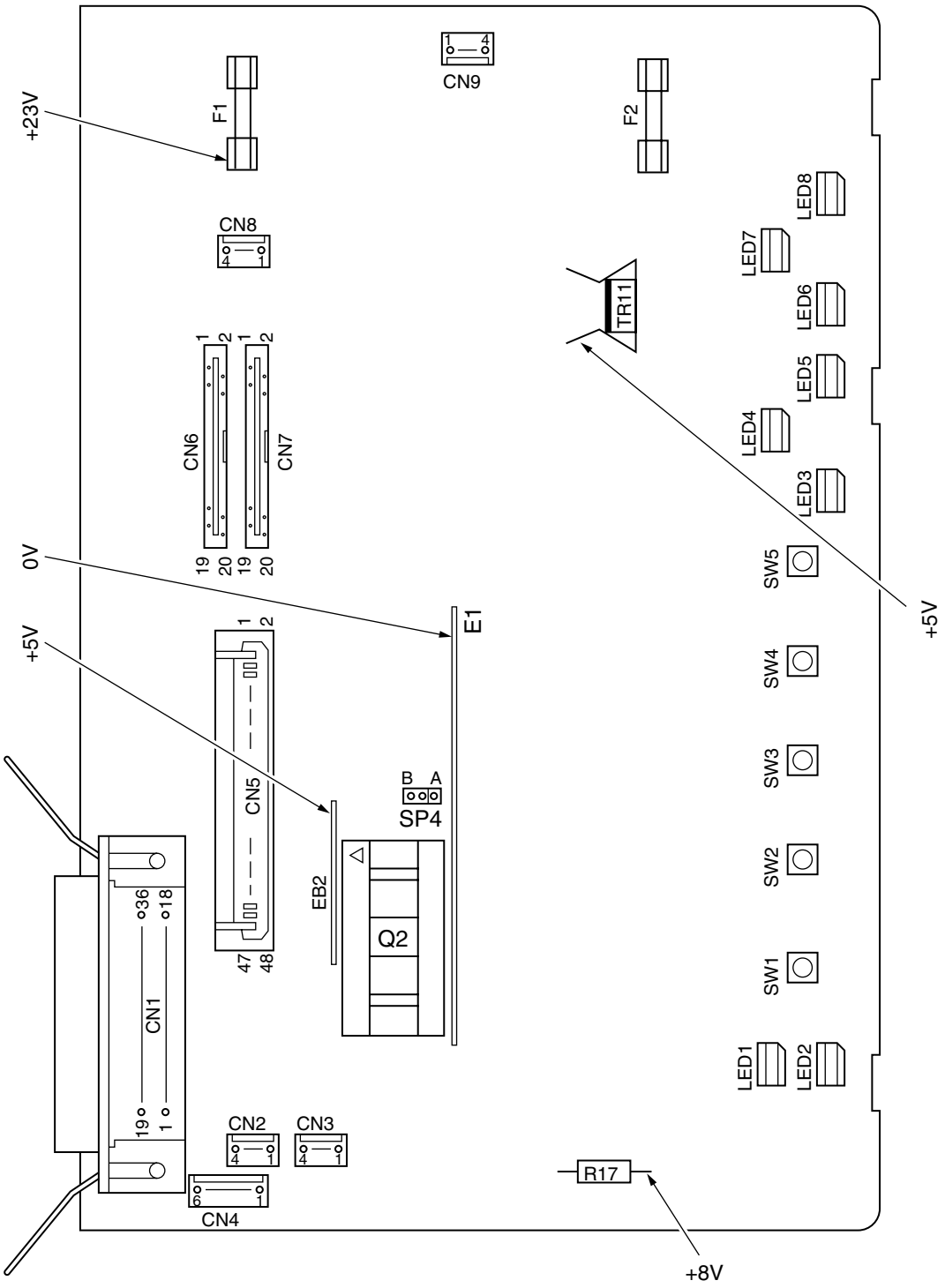


Figure 7-1 Voltage check points on the control printed circuit board (UMMB-)

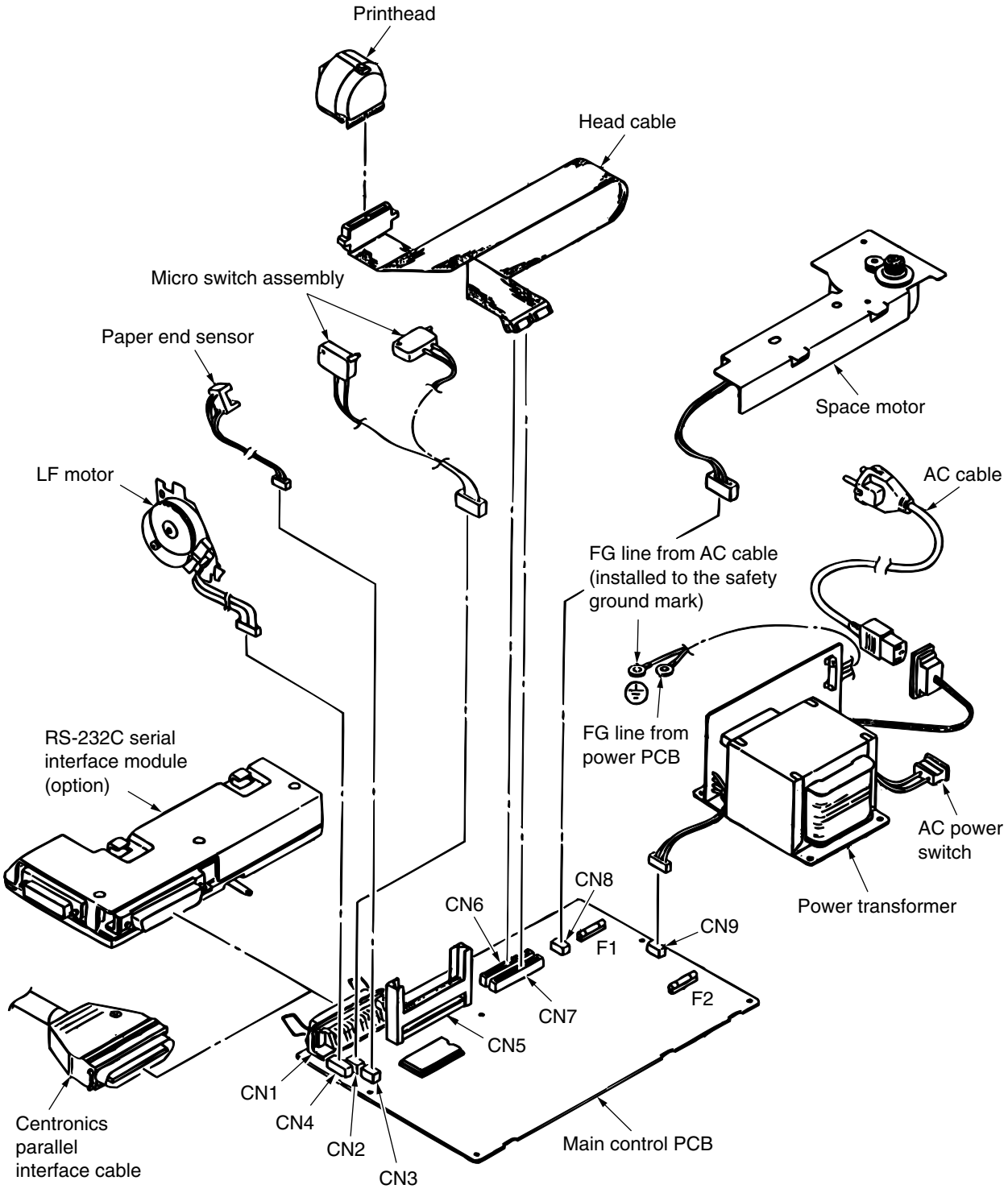


Figure 7-2 Connector location and pin No. (1/2)

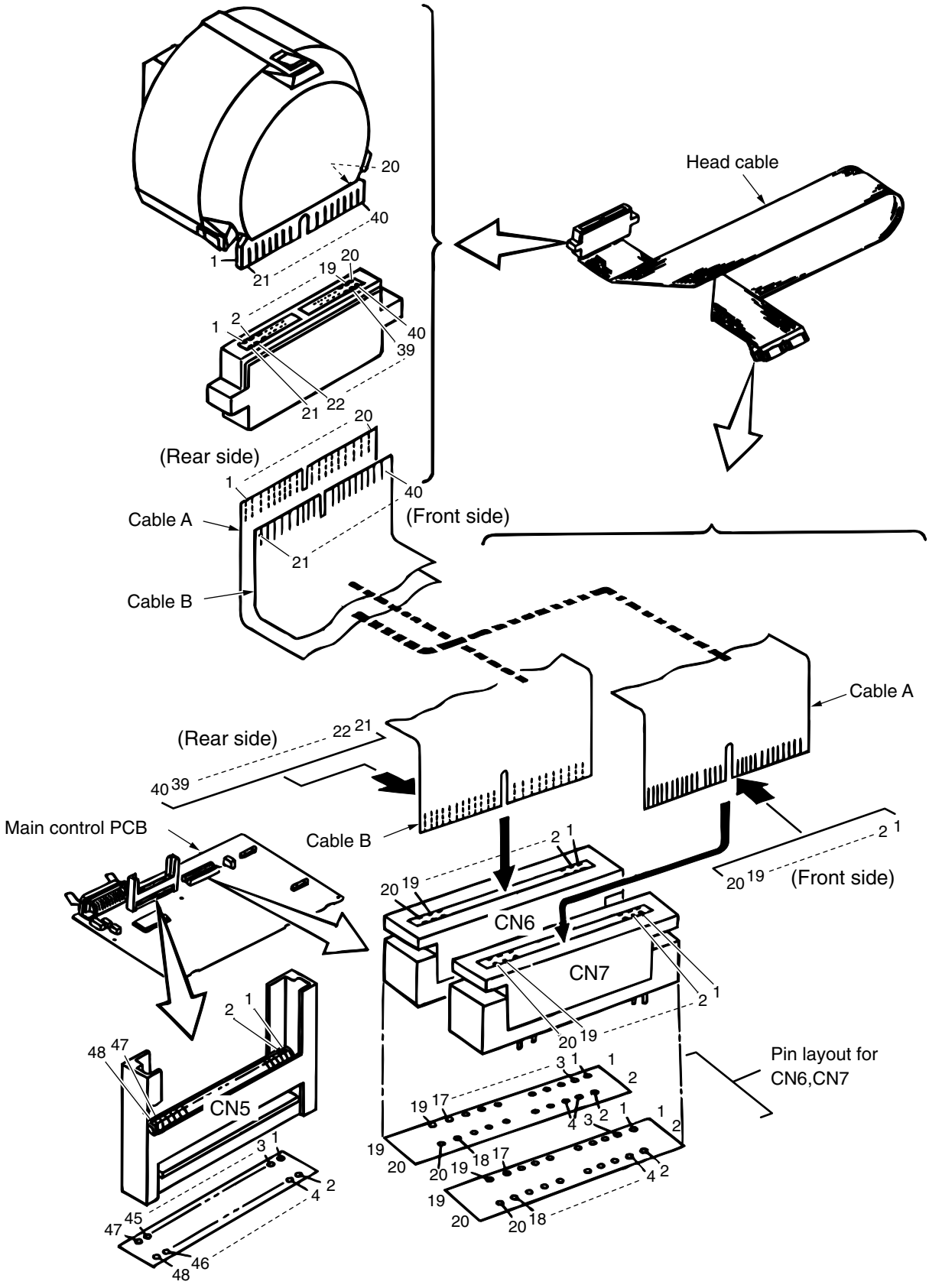


Figure 7-2 Connector location and pin No. (2/2)

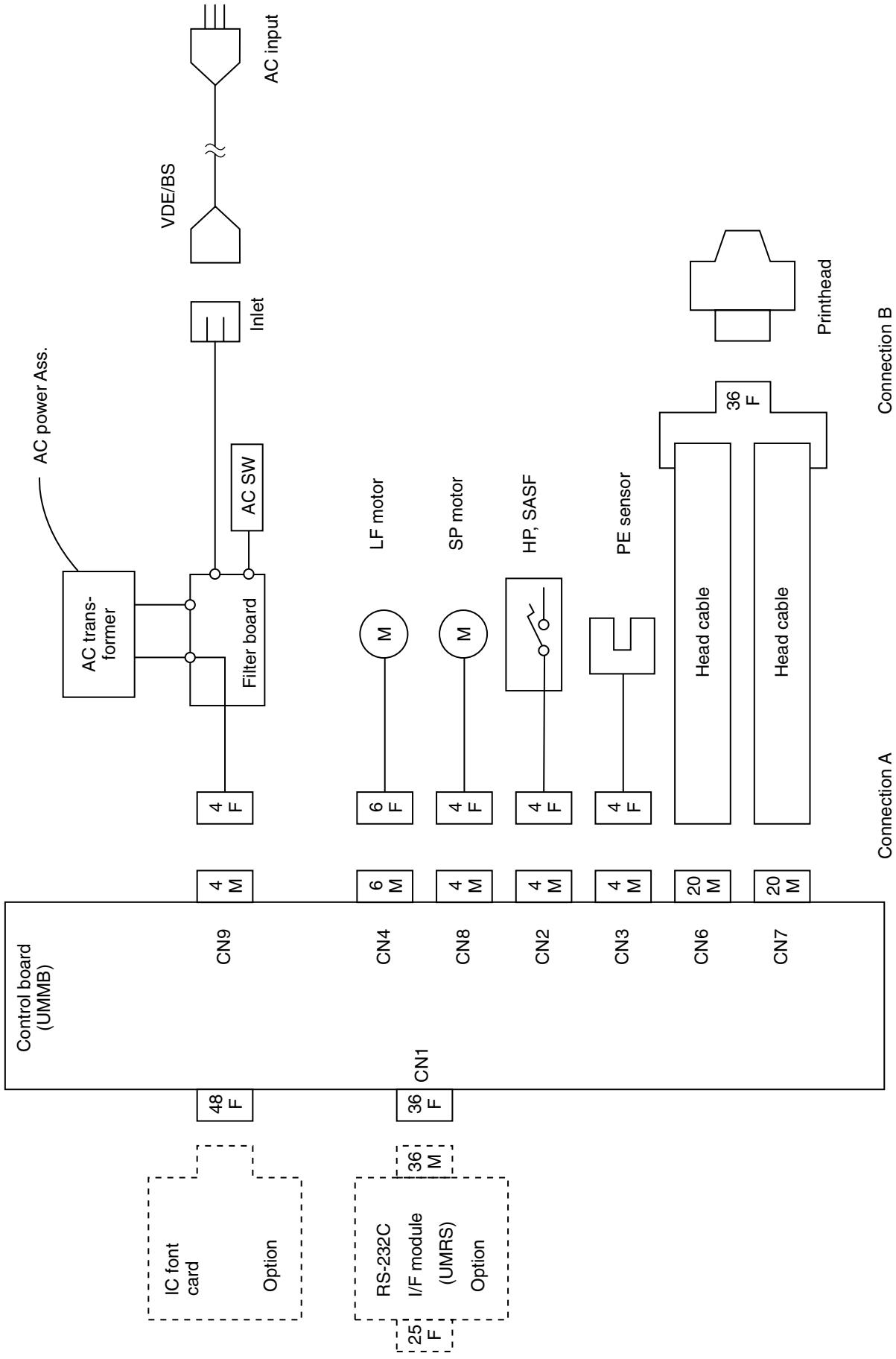


Figure 7-3 Block diagram

Table 7-4 Pin Numbers and signal names (1/2)

Name	Signal Name	Connection		Coil resistance	Figure
		A	B		
PRINTHEAD	SG	CN6-1	21	Approx. 18.3Ω	Contact on the printhead
	HD#6	2	22		
	HD#8	3	23		
	HD#14	4	24		
	HD#16	5	25		
	HEAD COMMON	6	26		
	HEAD COMMON	7	27		
	HD#24	8	28		
	HD#23	CN6-13	33		
	HEAD COMMON	14	34		
	HEAD COMMON	15	35		
	HD#15	16	36		
	HD#13	17	37		
	HD#7	18	38		
	HD#5	19	39		
	HD#1	CN7-19	19		
	HD#3	18	18		
	HD#9	17	17		
	HD#11	16	16		
	HEAD COMMON	15	15		
	HEAD COMMON	14	14		
	HD#17	13	13		
	HD#19	12	12		
	HD#21	11	11		
	HD#22	10	10		
	HD#20	9	9		
	HD#18	8	8		
	HEAD COMMON	7	7		
	HDAD COMMON	6	6		
	HD#12	5	5		
	HC#10	4	4		
	HD#4	3	3		
	HD#2	2	2		
	HDAD TH	1	1		

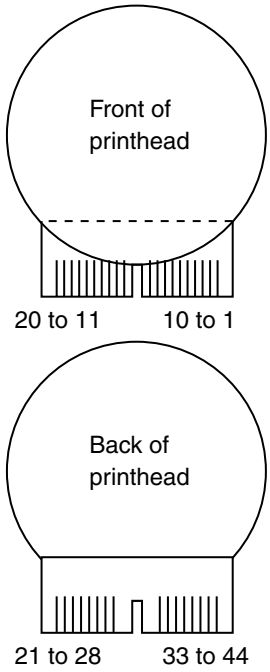
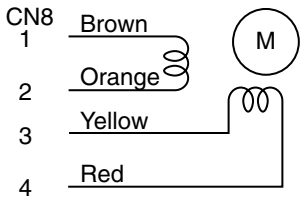
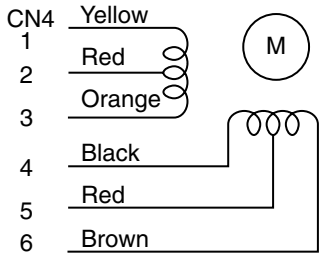
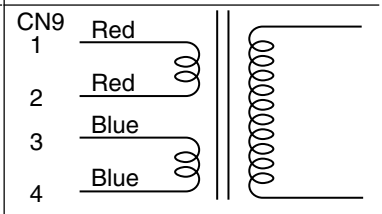
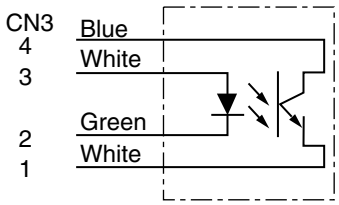
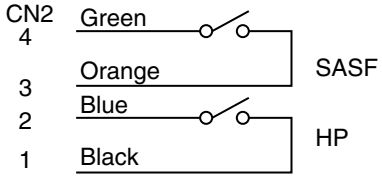


Table 7-4 Pin Numbers and signal names (2/2)

Name	Connector		Signal Name	Coil resistance	Figure
	Name	Pin No.			
SPACE MOTOR	CN 8	1	SPMOØ1	Approx.5.2Ω	
		2	SPMOØ3		
		3	SPMOØ2		
		4	SPMOØ4		
LINE FEED MOTOR	CN 4	1	LFMOØ1	Approx.29Ω	
		2	LFCOMØ1.3		
		3	LFMOØ3		
		4	LFMOØ4		
		5	LFCOMØ2.4		
		6	LFMOØ2		
POWER TRANS-FORMER	CN 9	1	AC27.5V		
		2	AC27.5V		
		3	AC8.9V		
		4	AC8.9V		
PAPER END SENSOR	CN 3	4	PE1		
		3	PE2		
		2	SG1		
		1	SG2		
MICRO SWITCH ASSEMBLY	CN 2	4	SASF		
		3	SG		
		2	HP		
		1	SG		

① No Power

- Is AC cable connected correctly?

YES / NO

- Connect the AC cables correctly.

- Is the AC fuse open on filter board?

NO / YES

- Replace the fuse.

- Are +5V and +35V output on the control board?

  +5V : Measurement can be taken between EB2 and EB4.

  +35V : Measurement can be taken between F1 and EB4.

YES / NO

Ⓐ→

- Is the fuse F1 or F2 open on the control board?

NO / YES

- Replace the fuse F1 or F2.

- Is the connector CN9 connected normally?

YES / NO

- Connect the connector CN9 correctly.

- Pull the connector CN9. Is 82.5 VAC output between the CN9 1 and 2 pins? Is 13.35 VAC output between the CN9 3 and 4 pins?

YES / NO

- Replace the transformer assembly. (See section 4.3.22.)

- Replace the control board. (See section 4.3.9.)

- Replace the control board.

② Space operation does not operate normally

- Is the carriage assembly moving erratic or jammed?

YES

NO

- Check around the carriage assembly space belt and space motor and repair the mechanism.

- Are +5V and +35V output to the control board?

YES

NO

- To page 93Ⓐ.

- Is the connector (CN8) connected normally?

YES

NO

- Connect it correctly.

- Is the connector (CN2) connected normally?

YES

NO

- Connect it correctly.

- Replace the control board. (See section 4.3.9.)
- Is condition corrected?

YES

NO

- Replace the space motor. (See section 4.3.23.)

- END

③ Wrong character, character or dot omission

- Are connectors CN6 and CN7 connected normally?

YES

NO

- Connect it normally.

- Is the head cable inserted into the printhead connector correctly?

YES

NO

- Reseat the head cable to the printhead connector correctly.

- Replace the printhead.
- Is condition corrected?

YES

NO

- Replace the control board.
- Is condition corrected?

NO

YES

- END

- Replace the head cable. (See section 4.3.7.)

- Is space belt too slack?

NO

YES

- Loosen screw of idle pulley bracket, and fasten it.

- END

④ Line feed trouble

- Rotate the platen knob.
- Does the platen rotate smoothly?

YES

NO

- Pull the release lever to the open position (front of printer).
- Does the platen rotate smoothly?

YES

NO

- Reinstall paper.
- Ensure no foreign matter or dust is present on the platen gear, idler gear or drive gear.
- Ensure smooth meshing of the platen gear, idler gear and drive gear.
- Ensure correct operation of the push tractor assembly (R) or (L). (See Section 4.3.19.)
- Replace the push tractor assembly (R) or (L). (See Section 4.3.19.)

- Is the connector (CN4) connected normally?

YES

NO

- Connect it normally?

- Are +5V and +35V connected to the control board?

YES

NO

- To page 93 Ⓐ.

- Replace the control board. (See Section 4.3.9.)
- Remedied?

YES

NO

- Replace the LF motor. (See Section 4.3.10.)

- END

⑤ Data receiving failure

- Is the SELECT lamp on?

YES

NO

- Set to SELECT mode.

- Is the interface cable connected correctly?

YES

NO

- Connect it correctly.

- Replace the control board.

APPENDIX A PCB LAYOUT

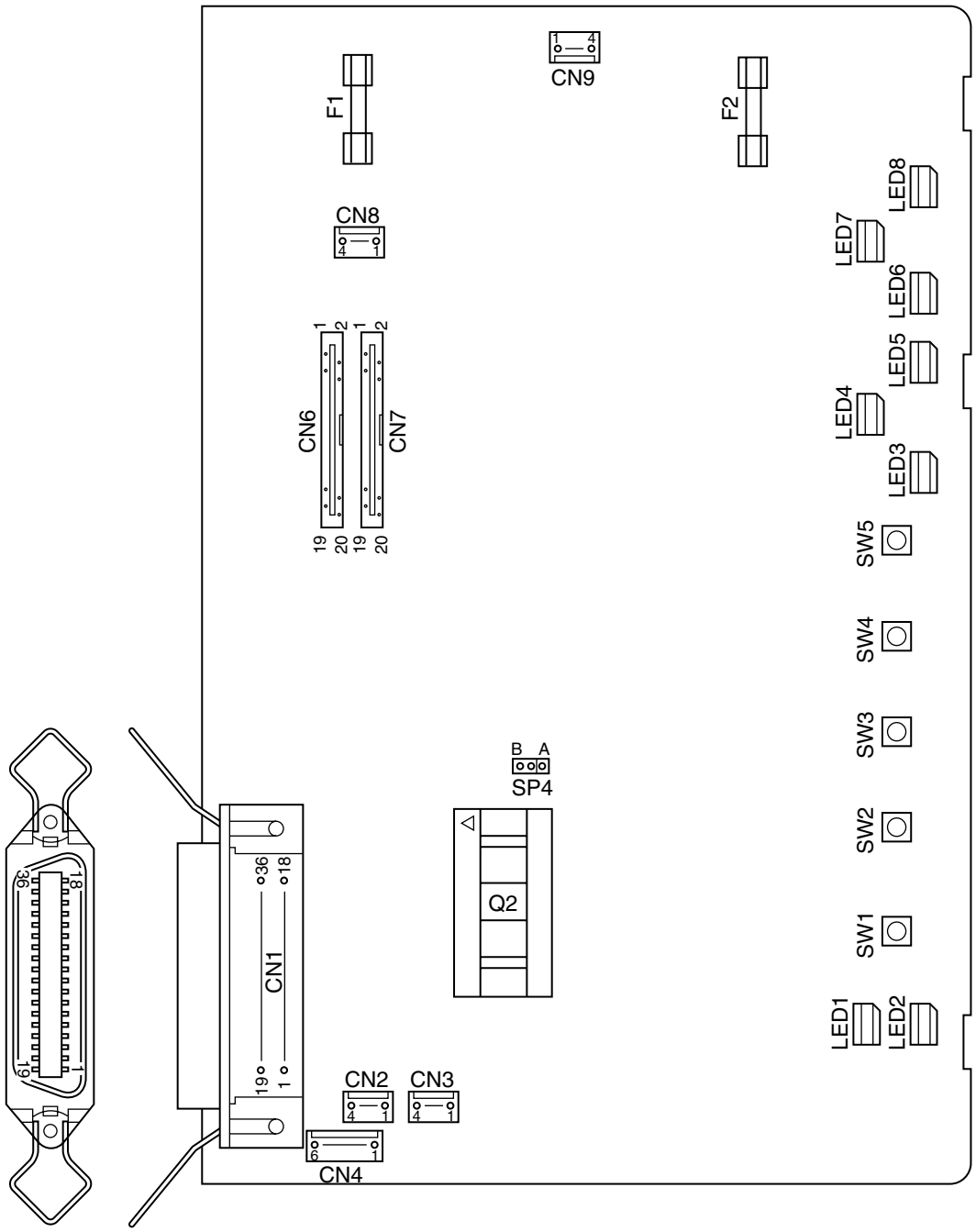


Figure A-1 Main control PCB

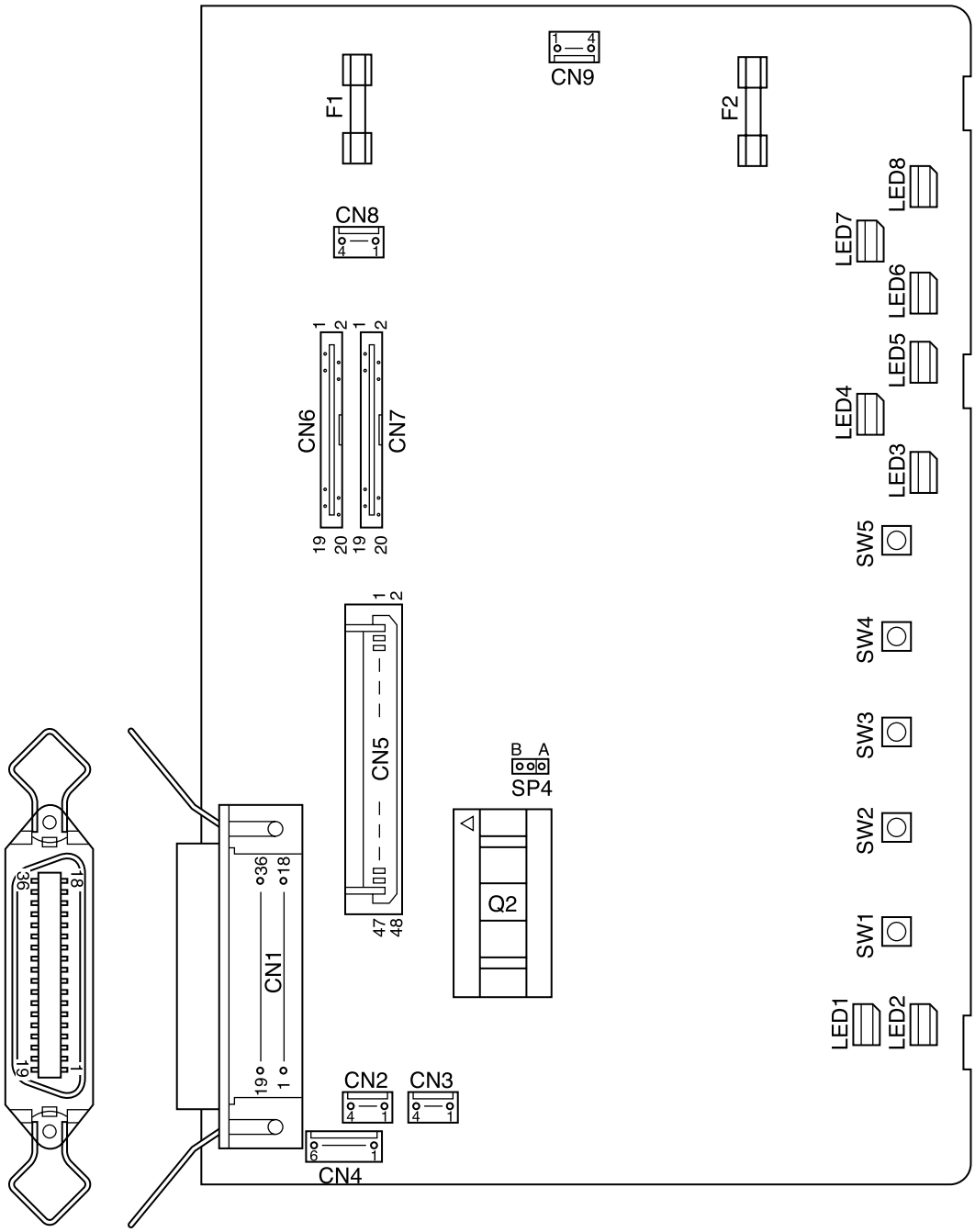


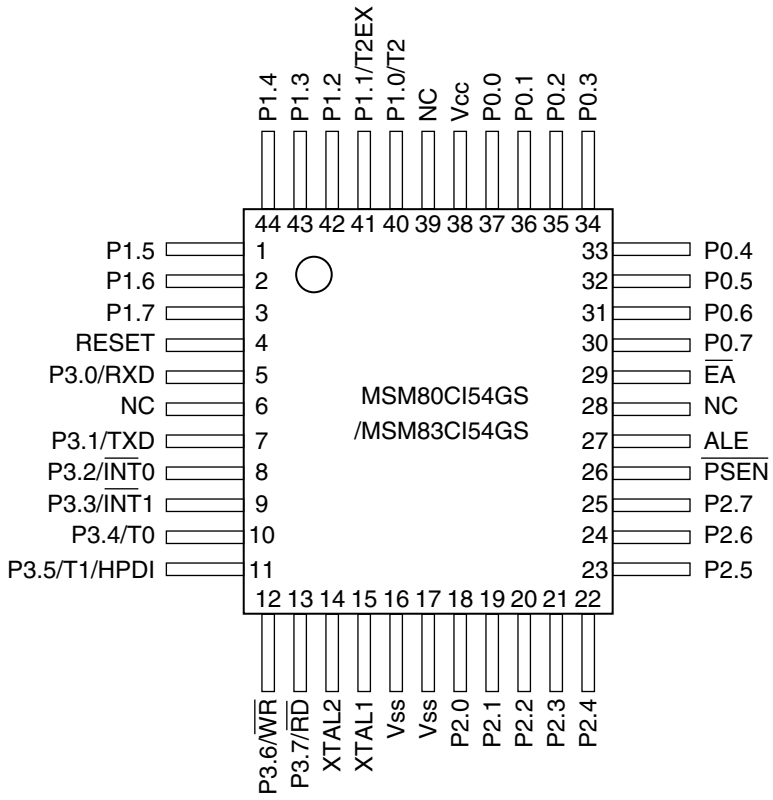
Figure A-1 Main control PCB

APPENDIX B SIGNAL LIST

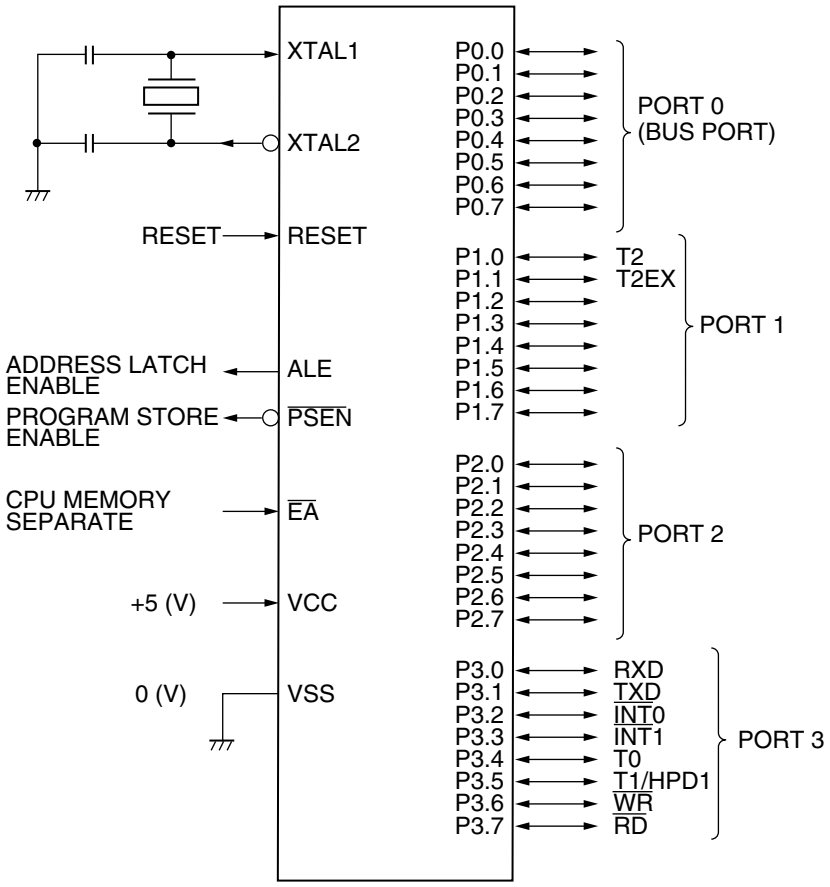
1. MSM83CI54 (μCPU)
2. LC92018B-283 (Q7)
3. LC92011B-358 (Q6)
4. Connector (CN1, 2, 3, 4, 5, 6, 7, 8, 9)

1. MSM83CI54 (μCPU)

1) Pin Location



2) Logical Circuit

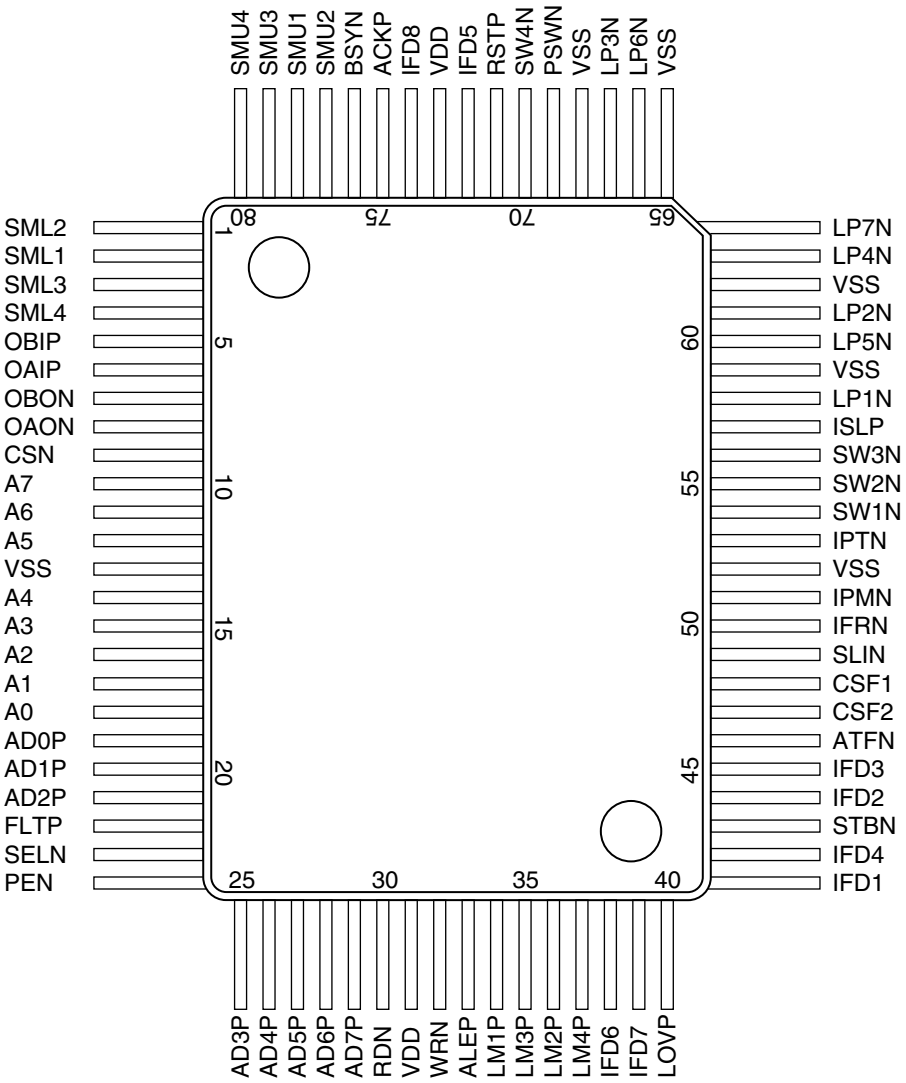


3) Signal List

No.	Terminal name	Signal name	I/O	Function
	(PORT 0)			
30~37	P0.7~P0.0	AD7~AD0	I/O	Address data bus
	(PORT 1)			
3	P1.7	BAIL OPEN-N	I	Bail arm open detection signal
1	P1.5	HP-N	I	Carriage home position detection signal
2	P1.6	PESNS-P	I	Paper end detection signal
44	P1.4	HEAD TEMP-P	I	Head temperature alarm detection signal Head thermistor open detection signal
43	P1.3	DC LOW-P	I	Head voltage drop detection signal
42	P1.2	CUT SHEET-N	I	Cut-sheet detection signal (Not used)
41	P1.1	IC CARD CONNECT-N	I	IC CARD connection signal
40	P1.0	WR-PROTECT-P	I	IC CARD write protect signal
	(PORT 2)			
18~25	P2.7~P2.0	A15~A8	O	Address bus
	(PORT 3)			
13	P3.7	RD-N	O	Port 0 data read signal
12	P3.6	WR-N	O	Write Port 0 data in the external data memory.
11	P.3.5 (T1)	CPU EA-N	O	CPU incorporating mask ROM selection signal
10	P.3.4 (TO)	EEPROM CLK-P	O	EEPROM clock output signal
9	P3.3 ($\overline{INT1}$)	EPROM SC-P	O	EEPROM chip select output signal
8	P3.2 ($\overline{INTO}$)	IPT-N	I	SP/PR TMG interruption input signal from LSI1
7	P3.1 (TXD)	EEPROM DI-P	O	EEPROM input data DI output signal
5	P3.0 (RXD)	EEPROM DO-P	I	EEPROM output data DO is input
14	XTAL2		I	Basic clock input
15	XTAL1		I	
4	RESET	RST-P	I	Head reset signal input
29	$\overline{EA}$		I	Internal ROM/external ROM SELECT signal
27	ALE	ALE-P	O	Clock signal latching address signals A0-A7 externally
26	$\overline{PSEN}$		O	When data in the external program memory is fetched, this signal is output and enables program data.
6, 28, 39	NC			
38	VCC			+5V
16, 17	GND			Ground for logical circuit

2. LC92018B-283 (Q7)

1) Pin Layout Drawing



2) Signal List

(1/4)

No.	Terminal name	In/ Out	Pin No.	Initialized state	Input/output cell name	Function
1	CSN	I	9	-	Non-reverse input(TTL)	LSI chip select signal input
2	RDN	I	30	-	Non-reverse input(TTL)	μCPU READ signal input
3	WRN	I	32	-	Non-reverse input(TTL)	μCPU WRITE signal input
4	ALEP	I	33	-	Non-reverse input(TTL)	μCPU address latch enable signal input
5	RSTP	I	71	-	Schmidt trigger(CMOS)	RESET signal input
6	AD0P	I/O	19	-	Bi-directional bus(TTL)	μCPU address data bus
7	AD1P	I/O	20	-	Bi-directional bus(TTL)	
8	AD2P	I/O	21	-	Bi-directional bus(TTL)	
9	AD3P	I/O	25	-	Bi-directional bus(TTL)	
10	AD4P	I/O	26	-	Bi-directional bus(TTL)	
11	AD5P	I/O	27	-	Bi-directional bus(TTL)	
12	AD6P	I/O	28	-	Bi-directional bus(TTL)	
13	AD7P	I/O	29	-	Bi-directional bus(TTL)	
14	IFD8	I/O	74	Z	Bi-directional bus(TTL)	General-purpose input/output port
15	IFD7	I/O	39	Z	Bi-directional bus(TTL)	
16	IFD6	I/O	38	Z	Bi-directional bus(TTL)	
17	IFD5	I/O	72	Z	Bi-directional bus(TTL)	
18	IFD4	I/O	42	Z	Bi-directional bus(TTL)	
19	IFD3	I/O	45	Z	Bi-directional bus(TTL)	
20	IFD2	I	44	Z	Bi-directional bus(TTL)	
21	IFD1	I	41	Z	Bi-directional bus(TTL)	

(2/4)

No.	Terminal name	In/ Out	Pin No.	Initialized state	Input/output cell name	Function	
22	IFRN	I	50	-	Non-reverse input(TTL)	Interface control signal input port	(Serial I/F module mounting detection signal input)
23	STBN	I	43	-	Schmidt trigger(TTL)		(Strobe signal input)
24	ISLP	I	57	-	Schmidt trigger(TTL)		(Interface control switching signal input)
25	SLIN	I	49	-	Schmidt trigger(TTL)		(Select-IN signal input)
26	ATFN	I	46	-	Schmidt trigger(TTL)		(AUTO FEED signal input)
27	PSWN	I	69	-	With pull-up(CMOS)	General-purpose input port	(PITCH SW)
28	SW4N	I	70	-	With pull-up(CMOS)		(FONT SW)
29	SW3N	I	56	-	With pull-up(CMOS)		(TOF/PARK SW)
30	SW2N	I	55	-	With pull-up(CMOS)		(FEED SW)
31	SW1N	I	54	-	With pull-up(CMOS)		(SELECT SW)
32	OAIP	I	6	-	Non-reverse input(TTL)	Space stepping motor compensated over-drive basic signal input	
33	OBIP	I	5	-	Non-reverse input(TTL)	Space stepping motor compensated over-drive basic signal input	
34	FLTP	O	22	N	Non-reverse input(TTL)	Interface control signal output port	(FAULT)
35	BSYN	O	76	N	Non-reverse input(TTL)		(BUSY)
36	PEN	O	24	P	Non-reverse input(TTL)		(PE)
37	SELN	O	76	P	Non-reverse input(TTL)		(SELECT)
38	IPMN	I	51	-	Schmidt trigger(TTL)	Interface control signal input port (I-PRIME)	
39	ACKP	O	75	N	Reverse output(TTL)	Interface control signal output port (ACK)	
40	OAON	O	8	Z	Open drain 3 mA	Space stepping motor over-drive basic signal output	
41	OBON	O	7	Z	Open drain 3 mA	Space stepping motor over-drive basic signal output	

(3/4)

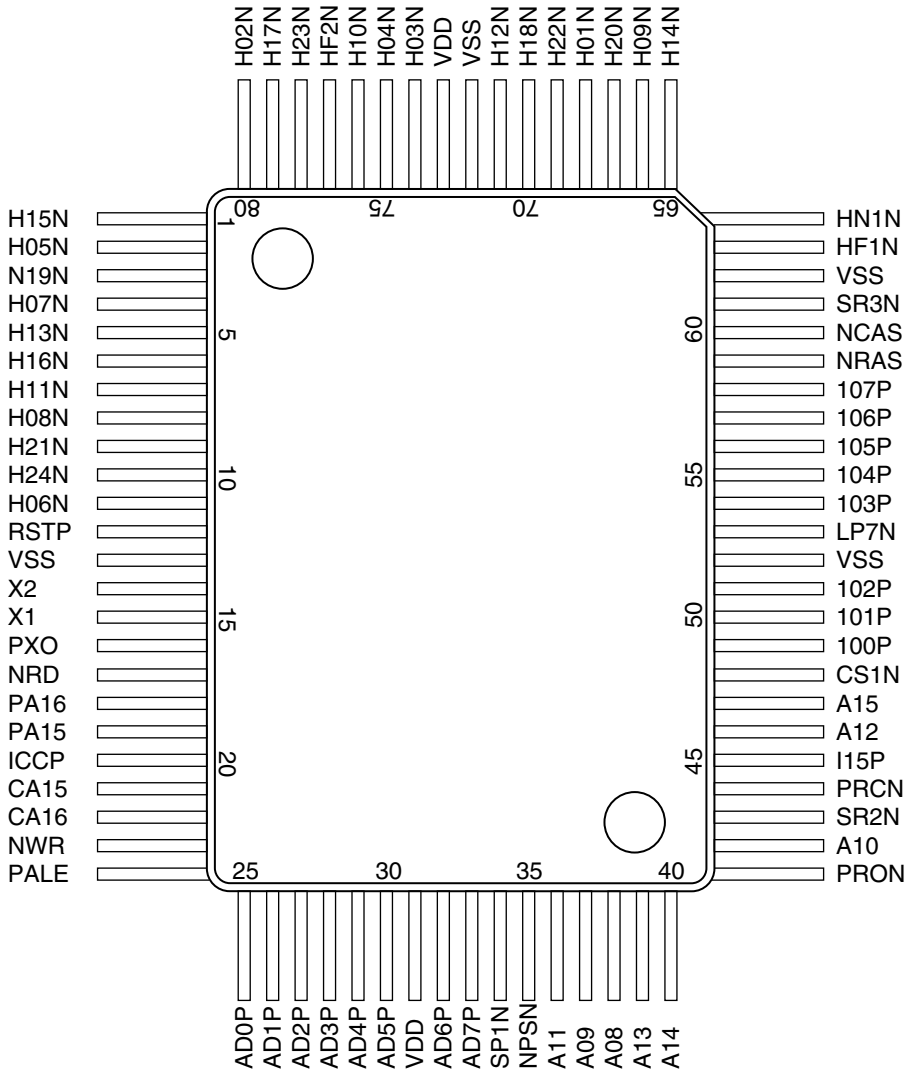
No.	Terminal name	In/ Out	Pin No.	Initialized state	Input/output cell name	Function
42	SMU1	O	78	Z	Open drain 3 mA	Space stepping motor over-drive signal output
43	SMU2	O	77	Z	Open drain 3 mA	
44	SMU3	O	79	N	Open drain 3 mA	
45	SMU4	O	80	N	Open drain 3 mA	
46	SML1	O	2	P	Non-reverse output 12 mA	Space stepping motor phase signal output
47	SML2	O	1	P	Non-reverse output 12 mA	
48	SML3	O	3	N	Non-reverse output 12 mA	
49	SML4	O	4	N	Non-reverse output 12 mA	
50	CSF2	O	47	N	3-state 3 mA	Output port
51	CSF1	O	48	N	3-state 3 mA	Output port
52	LOVP	O	40	N	3-state 3 mA	LF stepping motor over-drive signal input
53	LM4P	O	37	N	Non-reverse output 6 mA	LF stepping motor phase signal output
54	LM3P	O	35	N	Non-reverse output 6 mA	
55	LM2P	O	36	P	Non-reverse output 6 mA	
56	LM1P	O	34	P	Non-reverse output 6 mA	
57	A0	O	18	N	Non-reverse output(TTL)	μCPU low-order 8-bit address signal
58	A1	O	17	N	Non-reverse output(TTL)	
59	A2	O	16	N	Non-reverse output(TTL)	
60	A3	O	15	N	Non-reverse output(TTL)	
61	A4	O	14	N	Non-reverse output(TTL)	
62	A5	O	12	N	Non-reverse output(TTL)	
63	A6	O	11	N	Non-reverse output(TTL)	
64	A7	O	10	N	Non-reverse output(TTL)	
65	IPTN	O	53	P	Non-reverse output(TTL)	Print timing signal output

(4/4)

No.	Terminal name	In/ Out	Pin No.	Initialized state	Input/output cell name	Function	
66	LP1N	O	58	Z	3 state 12 mA × 2	LED drive general-purpose current output port	(Centronics I/F +5V ON/OFF signal)
67	LP2N	O	61	Z	3 state 12 mA × 2		(20)
68	LP3N	O	61	Z	3 state 12 mA × 2		(15)
69	LP4N	O	63	Z	3 state 12 mA × 2		(10)
70	LP5N	O	60	Z	3 state 12 mA × 2		(COURIER)
71	LP6N	O	66	Z	3 state 12 mA × 2		(PRESTIGE)
72	LP7N	O	64	Z	3 state 12 mA × 2		(ROMAN)
73	VSS		59			Signal ground input	
74	VSS		62				
75	VSS		65				
76	VSS		68				
77	VSS		13				
78	VSS		52			+5V input	
79	VDD		31				
80	VDD		73				

3. LC92011B-358 (Q6)

1) Pin Layout Drawing



2) Signal List

(1/4)

No.	Terminal name	In/ Out	Pin No.	Initialized state	Input/output cell name	Function
1	PALE	I	24	-	Non-reverse input(TTL)	µCPU address latch enable signal input
2	XI	I	15	-	Oscillating amplifier	Basic clock input (Not used)
3	RSTP	I	12	-	Schmidt trigger input	RESET signal input
4	NRD	I	17	-	Non-reverse input(TTL)	µCPU READ signal input
5	NWR	I	23	-	Non-reverse input(TTL)	µCPU WRITE signal input
6	NPSN	I	35	-	Non-reverse input(TTL)	µCPU PSEN signal input
7	A15	I	47	-	Reverse input(TTL)	µCPU high-order 8-bit address signal input
8	A14	I	40	-	Reverse input(TTL)	
9	A13	I	39	-	Reverse input(TTL)	
10	A12	I	46	-	Reverse input(TTL)	
11	A11	I	36	-	Reverse input(TTL)	
12	A10	I	42	-	Reverse input(TTL)	
13	A09	I	37	-	Reverse input(TTL)	
14	A08	I	38	-	Reverse input(TTL)	
15	AD0P	I/O	25	-	Bi-directional bus(TTL)	µCPU address data bus
16	AD1P	I/O	26	-	Bi-directional bus(TTL)	
18	AD2P	I/O	27	-	Bi-directional bus(TTL)	
19	AD3P	I/O	28	-	Bi-directional bus(TTL)	
20	AD4P	I/O	29	-	Bi-directional bus(TTL)	
21	AD5P	I/O	30	-	Bi-directional bus(TTL)	
22	AD6P	I/O	32	-	Bi-directional bus(TTL)	

(2/4)

No.	Terminal name	In/ Out	Pin No.	Initialized state	Input/output cell name	Function
23	IO0P	I/O	49	-	Bi-directional bus(TTL)	General-purpose input port
24	IO1P	I/O	50	-	Bi-directional bus(TTL)	
25	IO2P	I/O	51	-	Bi-directional bus(TTL)	
26	IO3P	I/O	54	-	Bi-directional bus(TTL)	
27	IO4P	I/O	55	-	Bi-directional bus(TTL)	
28	IO5P	I/O	56	-	Bi-directional bus(TTL)	
29	IO6P	I/O	57	-	Bi-directional bus(TTL)	
30	IO7P	I/O	58	-	Bi-directional bus(TTL)	
31	H01N	O	68	H	Reverse output(TTL)	Printhead data signal output
32	H02N	O	80	H	Reverse output(TTL)	
33	H03N	O	74	H	Reverse output(TTL)	
34	H04N	O	75	H	Reverse output(TTL)	
35	H05N	O	2	H	Reverse output(TTL)	
36	H06N	O	11	H	Reverse output(TTL)	
37	H07N	O	4	H	Reverse output(TTL)	
38	H08N	O	8	H	Reverse output(TTL)	
39	H09N	O	66	H	Reverse output(TTL)	
40	H10N	O	76	H	Reverse output(TTL)	
41	H11N	O	7	H	Reverse output(TTL)	
42	H12N	O	71	H	Reverse output(TTL)	
43	H13N	O	5	H	Reverse output(TTL)	
44	H14N	O	65	H	Reverse output(TTL)	

(3/4)

No.	Terminal name	In/ Out	Pin No.	Initialized state	Input/output cell name	Function
45	H15N	O	1	H	Reverse output(TTL)	Printhead data signal output
46	H16N	O	6	H	Reverse output(TTL)	
47	H17N	O	79	H	Reverse output(TTL)	
48	H18N	O	70	H	Reverse output(TTL)	
49	H19N	O	3	H	Reverse output(TTL)	
50	H20N	O	67	H	Reverse output(TTL)	
51	H21N	O	9	H	Reverse output(TTL)	
52	H22N	O	69	H	Reverse output(TTL)	
53	H23N	O	78	H	Reverse output(TTL)	
54	H24N	O	10	H	Reverse output(TTL)	
55	HF1	O	63	L	Open drain 6 mA	Printhead drive forced OFF signal output
56	HF2	O	77	L	Open drain 6 mA	
57	HN1N	O	64	Z	Open drain 6 mA	Printhead drive trigger signal output
58	CA15	O	21	L	2 input NAND output	CG ROM address signal output
59	SR3N	O	61	H	Non-reverse output	IC card READ signal output
60	CS1N	O	48	X	Reverse output	LSI chip select signal output
61	PA16	O	18	L	Non-reverse output	PG ROM address signal output
62	PA15	O	19	L	2 input NAND output	
63	CA16	O	22	L	Non-reverse output	CG ROM address signal output
64	SR2N	O	43	H	Non-reverse output	CG ROM READ signal output
65	PRCN	O	44	H	2 input NAND output	P'S-RAM select signal output
66	PRON	O	41	H	Non-reverse output	P'S-RAM READ signal output

(4/4)

No.	Terminal name	In/ Out	Pin No.	Initialized state	Input/output cell name	Function
67	115P	O	45	L	2 input NAND output	IC CARD address signal output
68	ICCP	O	20	L	Reverse output	IC card select signal output
69	SRIN	O	34	H	Non-reverse output	PG ROM READ signal output
70	LP7N	O	53	Z	3 state 12 mA x 2	LED drive general-purpose current output port (Select)
71	NRAS	O	59	L	Reverse output	D-RAM RAS signal output
72	NCAS	O	60	L	Reverse output	D-RAM CAS signal output
73	PXO	O	16	-	Non-reverse output	External clock output (Not used)
74	X2	O	14	-	Oscillating amplifer	Basic clock output (Not used)
75	V_{SS}		72	-		Signal ground output
76	V_{SS}		62	-		
77	V_{SS}		13	-		
78	V_{SS}		52	-		
79	V_{DD}		31	-		+5V input
80	V_{DD}		73	-		

4. CONNECTOR

No.	Signal abbreviation	Signal name	I/O	Function
<CN1>				
1	STB-N	Strobe-N	I	Parallel data sampling strobe
2	DATA1-P		I	Parallel data input
3	DATA2-P		I	
4	DATA3-P		I	
5	DATA4-P		I	
6	DATA5-P		I	
7	DATA6-P		I	
8	DATA7-P		I	
9	DATA8-P		I	
10	ACK-N	Acknowledge-N	O	Data input completion or function end
11	BUSY-P		O	During printer processing or alarm
12	PE-P	Paper End-P	O	Paper ending
13	SELECT-P		O	Select state (during ON-LINE)
14	AUTO FEED-N		I	Automatic line feeding control
15	Not used			
16	SG	Signal Ground		Signal ground
17	FG	Frame Ground		Safty ground
18	+5V		O	+5V supplied to serial I/F board
19~30	RET SG	Return Ground		Signal ground
31	I-PRIME-N		I	Reset signal
32	FAULT-N		O	Paper ending
33	SG	Signal Ground		Signal ground
34	Not used			
35	PULLED HIGH		I	Seial I/F board mounting detection signal
36	SLCT-IN-N	Select-In-N	I	Receive data receive/reject signal at HIGH level
<CN2>				
1, 3	SG	Signal Ground		Ground for logical circuit
2	HP	Home Position	I	Carriage home position detection signal
4	SASF	Semi-Auto Sheet Feeder	I	Bail arm lever open/close signal

No.	Signal abbreviation	Signal name	I/O	Function
<CN3>				
1	SG1	Signal Ground 1		Ground for logical circuit
2	SG2	Signal Ground 2		Ground for logical circuit
3	PE2	Paper End 2		Line supplying +5V to paper end sensor
4	PE1	Paper End 1	I	Continuous sheet end detection signal
<CN4>				
1	LF MOØ1	Line Feed Motor Ø1	O	LF motor phase signal
2	LS COMØ13	Line Feed Common Ø13	O	LF motor drive voltage supply line
3	LF MOØ3	Line Feed Motor Ø3	O	LF motor phase signal
4	LF MOØ4	Line Feed Motor Ø4	O	LF motor phase signal
5	LF COMØ24	Line Feed Common Ø24	O	LF motor drive voltage supply line
6	LF MOØ2	Line Feed Motor Ø2	O	LF motor phase signal
<CN5>				
1	SG	Signal Ground		Ground for logical circuit
2~5	Not used			
6	IC CARD CONNECT-N		I	IC CARD insertion detection signal
7	SYSTEM RD3-N	System Read 3	O	READ signal output from memory control LSI (for bank switching)
8~12	Not used			
13	IC A 15-P	Address Bus Signal	O	Address signal output from memory control LSI (for bank switching)
14~20	A14-P~A8-P	Address Bus Signal	O	µCPU high-order address signal
21~23	A7-P~A5-P	Address Signal	O	Low-order address signal after latching
24	+5V		O	Power for logical circuit
25	IC CARD CS-N	IC Card Chip Select	O	Chip select signal output from memory control LSI (for bank switching)
26~30	A4-P~A0-P	Address Signal	O	Low-order address signal after address latching
31~38	AD7-P~AD0-P	Address Data Bus Signal	I/O	µCPU address data bus signal
39	WR-PROTECT-P		I	IC card WRITE PROTECTION detection signal
40	Not used			
41	WR-N	Write-N	O	µCPU WRITE signal
42	Not used			
43	SG	Signal Ground		Ground for logical circuit
44~47	Not used			
48	+5V			Power for logical circuit

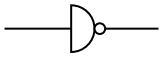
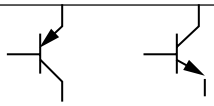
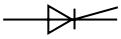
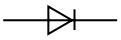
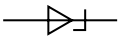
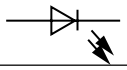
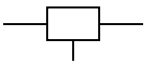
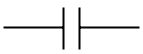
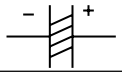
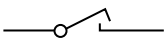
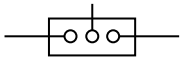
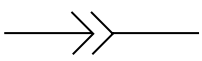
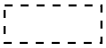
No.	Signal abbreviation	Signal name	I/O	Function
<CN6>				
1	SG			Ground for logical circuit
2	HD#6		O	Head pin drive selection signal
3	HD#8		O	
4	HD#14		O	
5	HD#16		O	
6, 7	HEAD COM-MON			Head pin drive voltage supply signal
8	HD#24		O	Head pin drive selection signal
9~12	SG			Ground for logical circuit
13	HD#23		O	Head pin drive selection signal
14, 15	HEAD COM-MON			Head pin drive voltage supply signal
16	HD#15		O	Head pin drive selection signal
17	HC#13		O	
18	HD#7		O	
19	HD#5		O	
20	Not used			
<CN7>				
1	HEAD TH		I	Head temperature alarm detection signal
2	HD#2		O	Head pin drive selection signal
3	HD#4		O	
4	HD#10		O	
5	HD#12		O	
6, 7	HEAD COM-MON			Head pin drive voltage supply signal
8	HD#18		O	Head pin drive selection signal
9	HD#20		O	
10	HD#22		O	
11	HD#21		O	
12	HD#19		O	
13	HD#17		O	
14, 15	HEAD COM-MON			Head pin drive voltage supply signal
16	HD#11		O	Head pin drive selection signal
17	HD#9		O	
18	HD#3		O	
19	HD#1		O	
20	Not used			

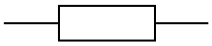
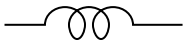
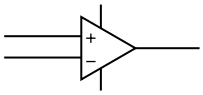
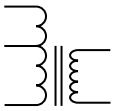
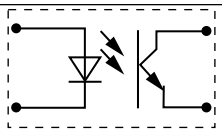
No.	Signal abbreviation	Signal name	I/O	Function
<CN8>				
1	SPMOØ1	Space Motor Ø1	O	Space motor phase signal
2	SPMOØ3	Space Motor Ø3	O	
3	SPMOØ2	Space Motor Ø2	O	
4	SPMOØ4	Space Motor Ø4	O	
<CN9>				
1	AC			
2				
3	AC			
4				

APPENDIX C CIRCUIT DIAGRAMS

Table C-1 shows the meanings of symbols used in the circuit diagrams and Figure C-1 shows the circuit diagram.

Table C-1 Table of Symbols

Symbol	Mark	Description
	Q	SN74LS06 Inverter (open collector)
	OSC	Ceramic oscillator
	TR	Transistor
	SCR	Thyristor
	D	Diode
	D	Zener diode
	D	Light-emitting diode
	REG	Regulator
	C	Capacitor
	C	Electrolytic capacitor
	R	Resistor
	SW	Switch
	SP	Jumper wire or plug
	CN	Connector (terminal)
(Reference) 		Means a single part
	FG	Frame ground

Symbol	Mark	Description
		Dot head (element)
	L	Coil
	Q	339 Comparator
	THERMISTOR	Thermistor
	SG	Signal ground
	TF	Transformer
		Photo sensor
	F	Fuse

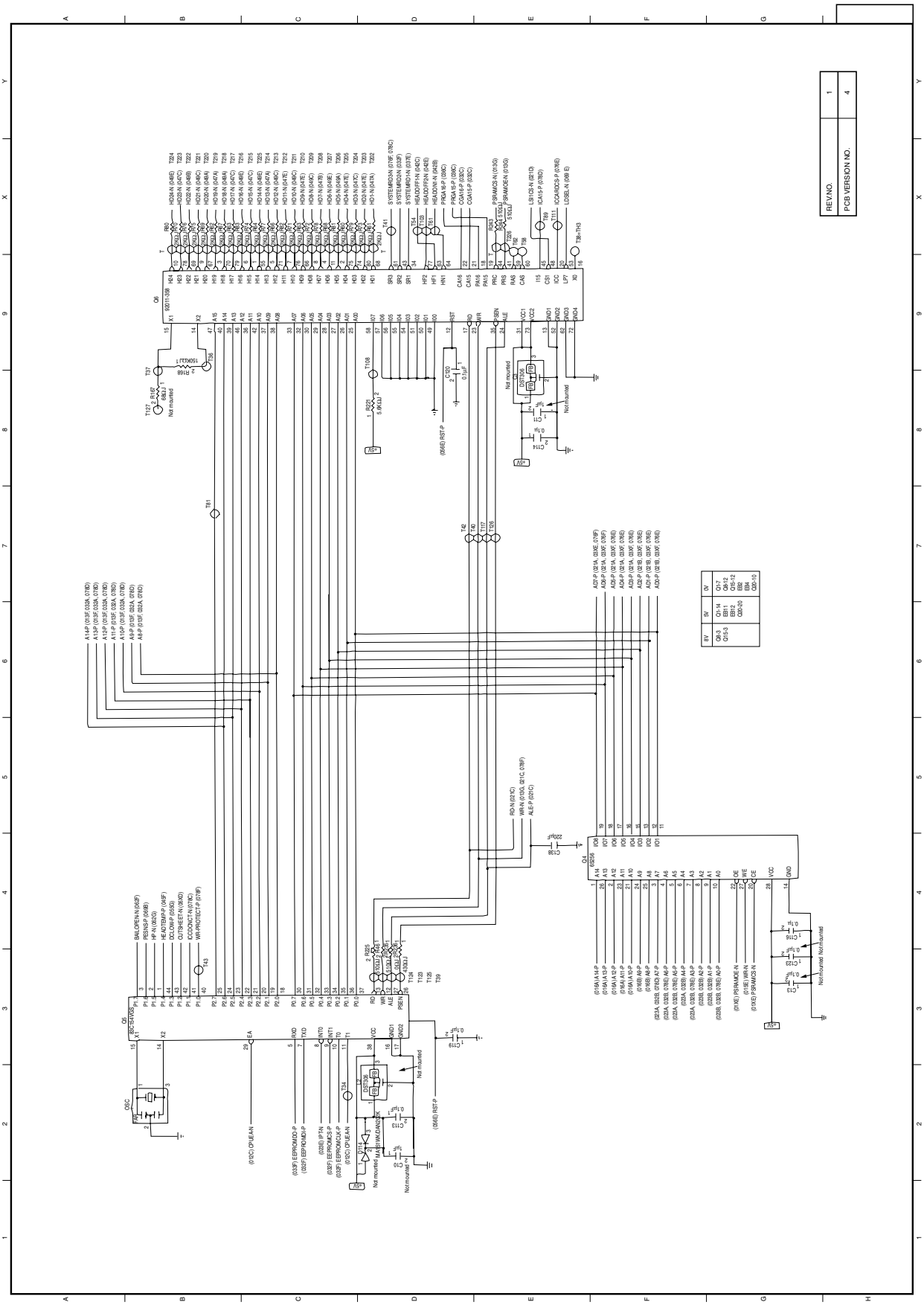


Figure C-1 Circuit Diagram of Main PCB (UMMB) (1/8)

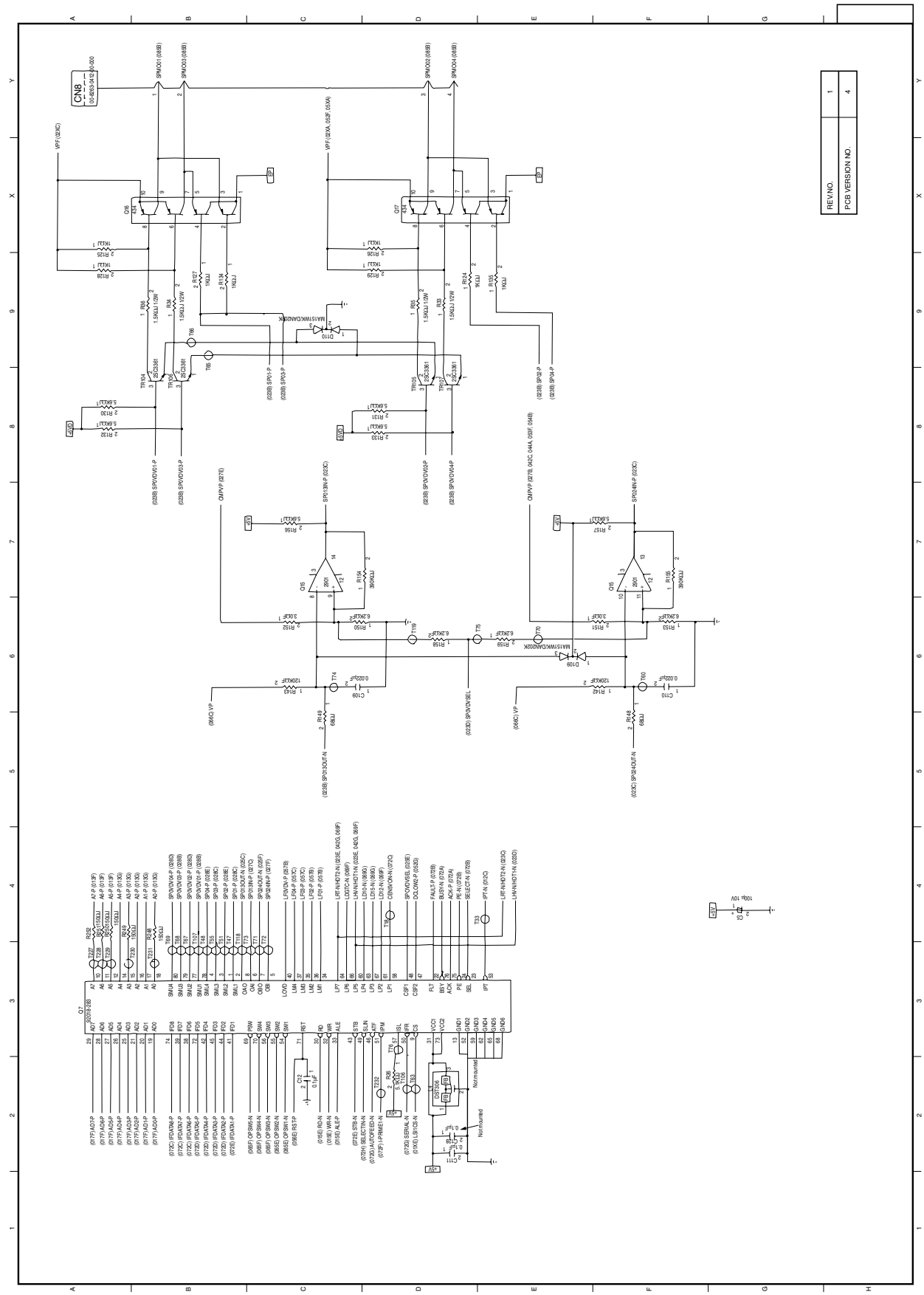


Figure C-1 Circuit Diagram of Main PCB (UMMB) (2/8)

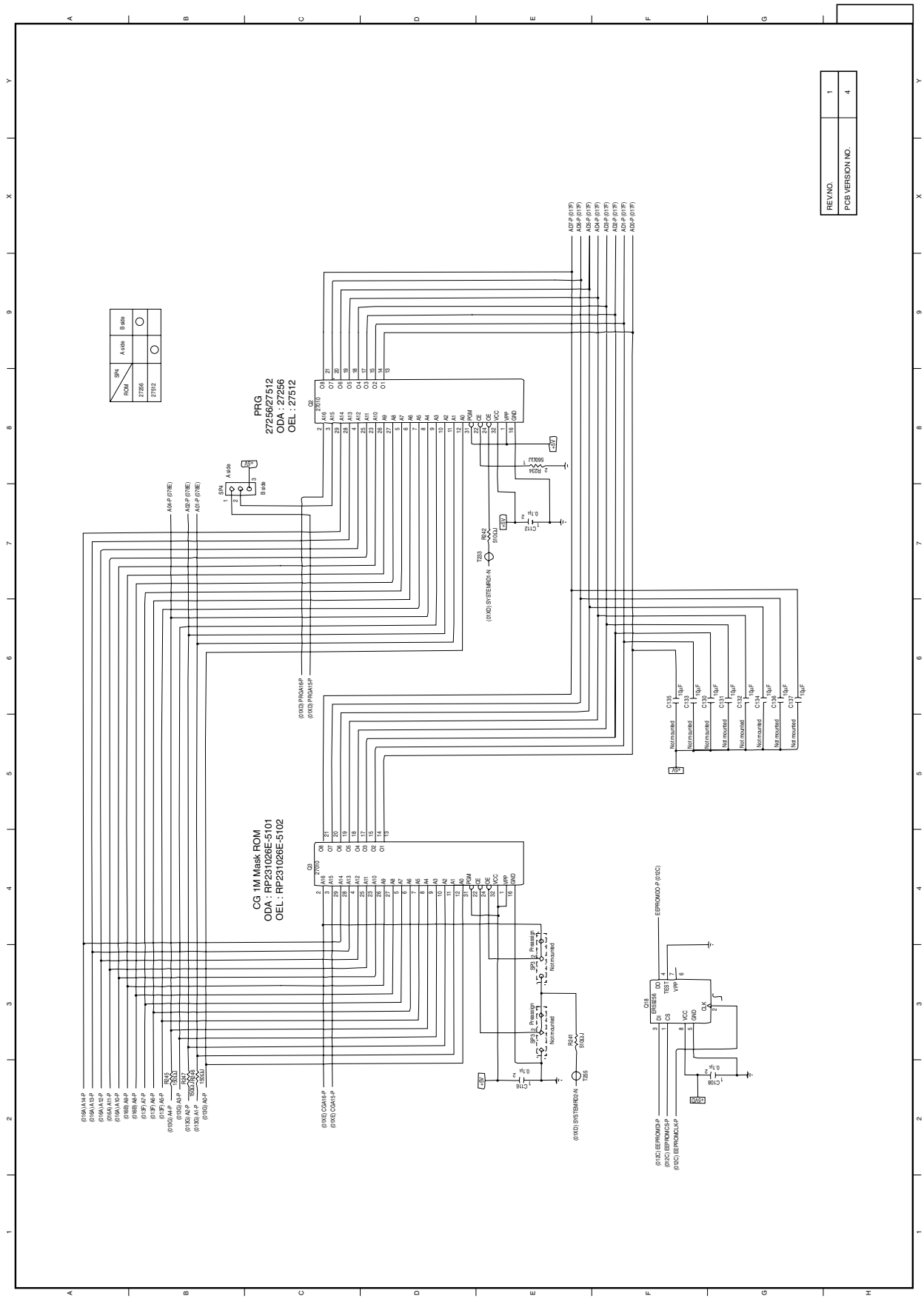


Figure C-1 Circuit Diagram of Main PCB (UMMB) (3/8)

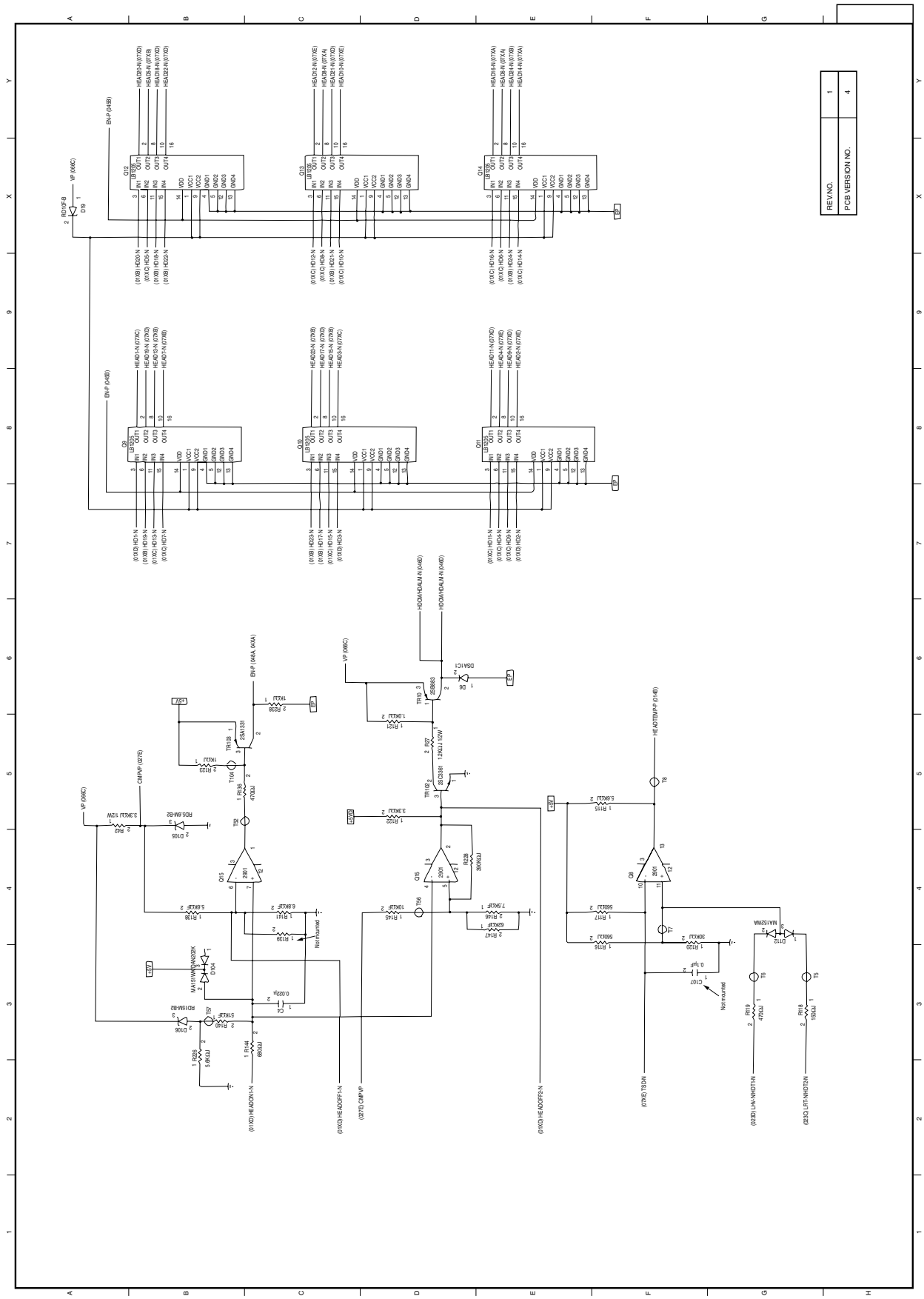


Figure C-1 Circuit Diagram of Main PCB (UMMB) (4/8)

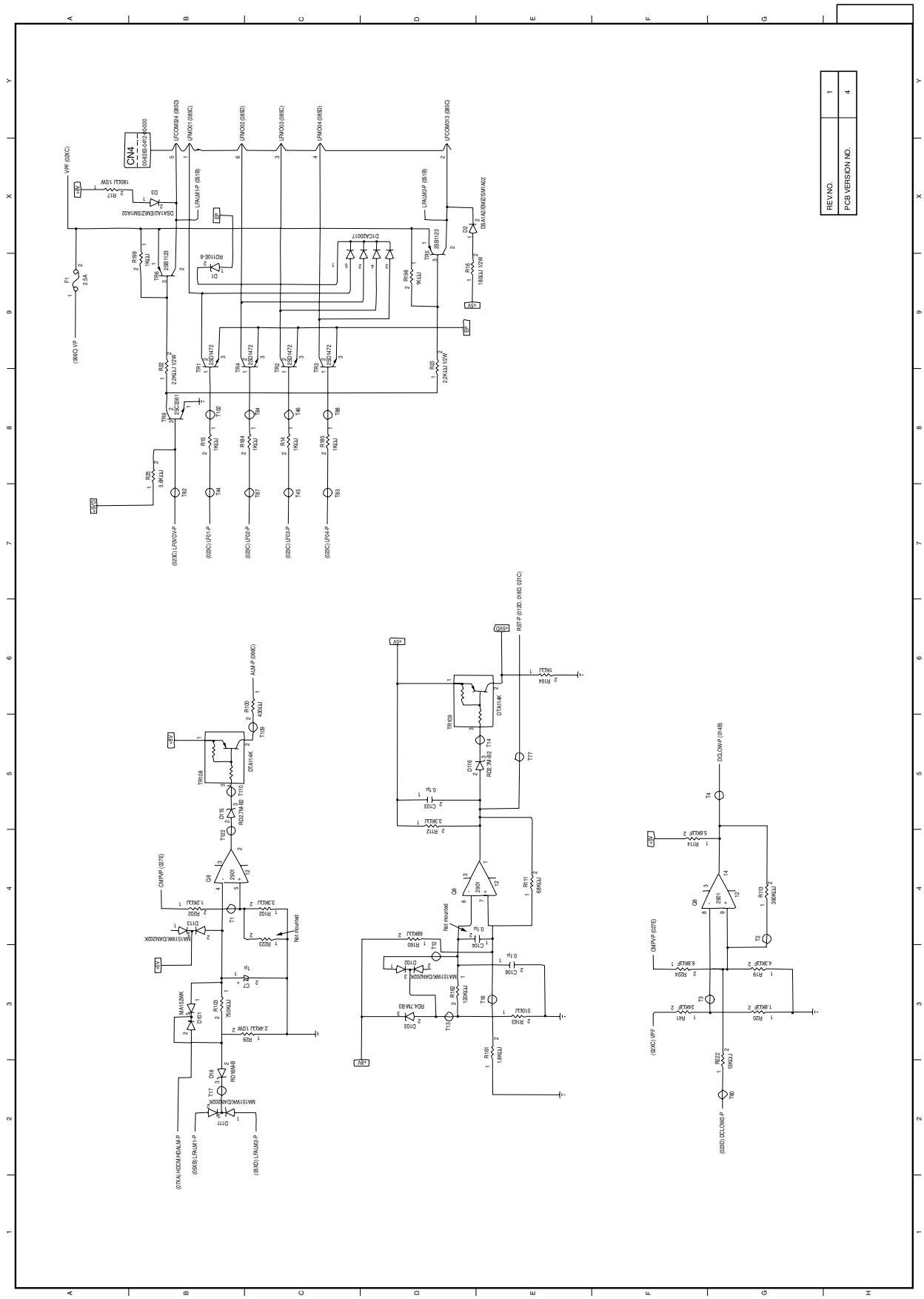


Figure C-1 Circuit Diagram of Main PCB (UMMB) (5/8)

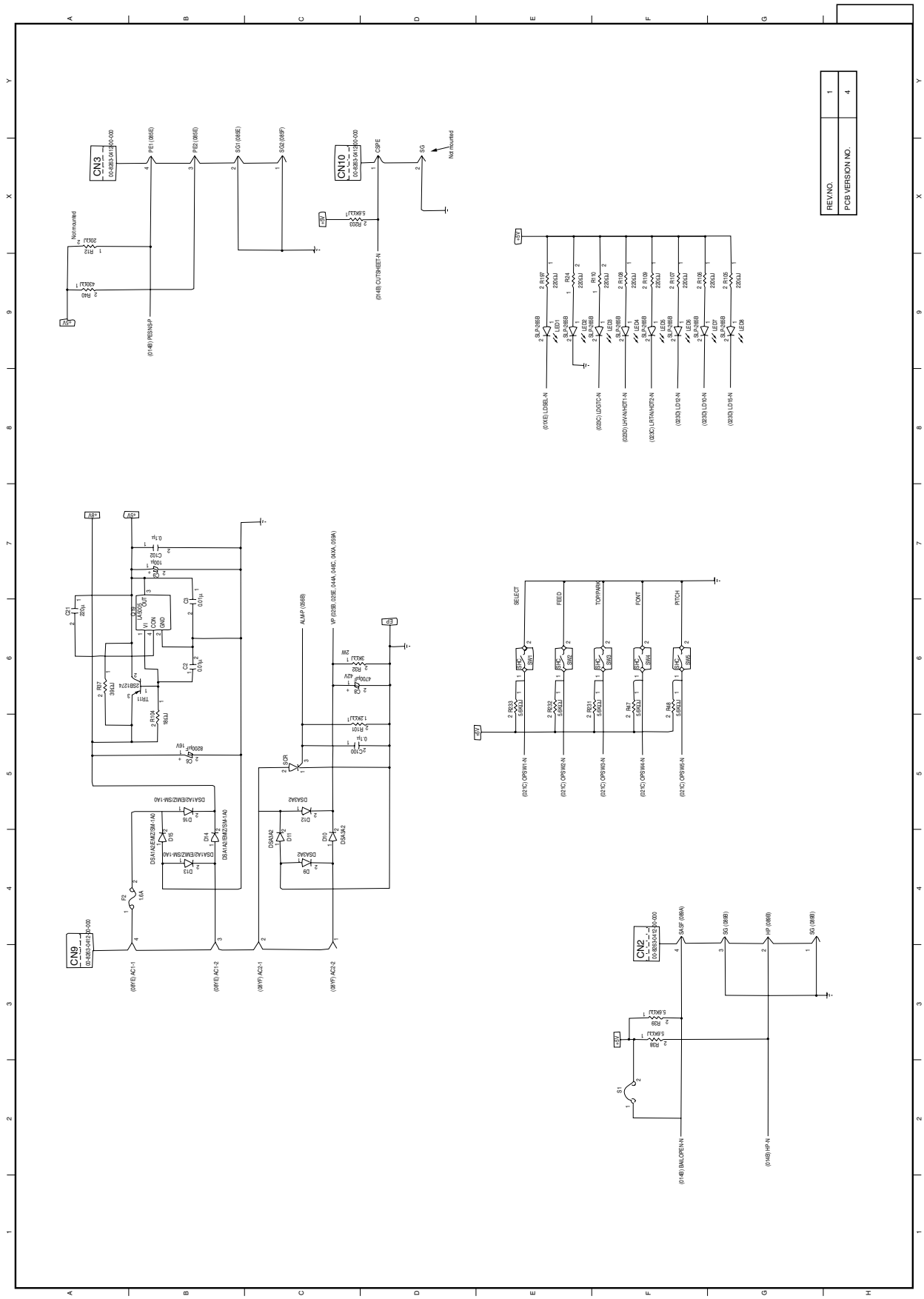


Figure C-1 Circuit Diagram of Main PCB (UMMB) (6/8)

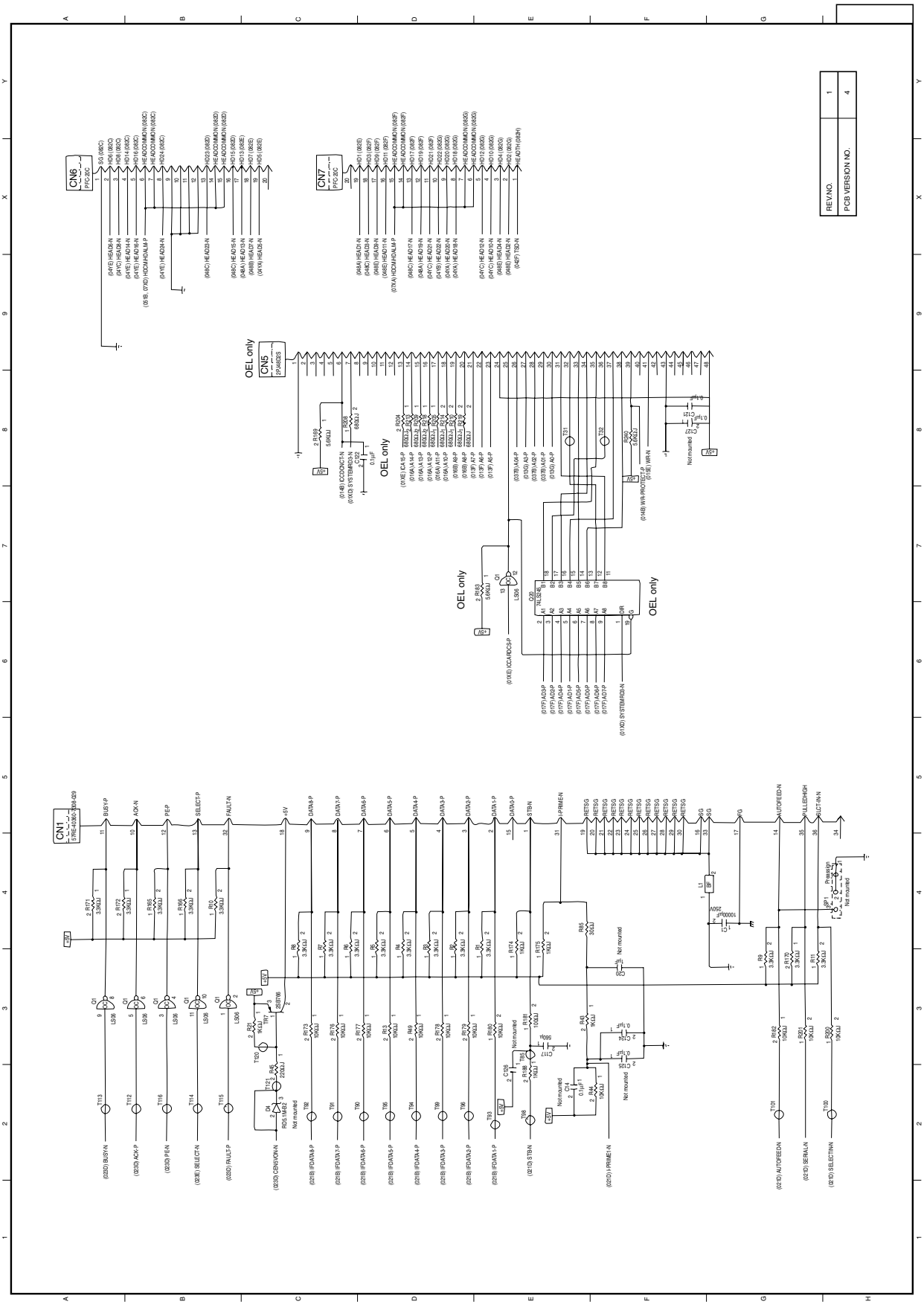


Figure C-1 Circuit Diagram of Main PCB (UMMB) (7/8)

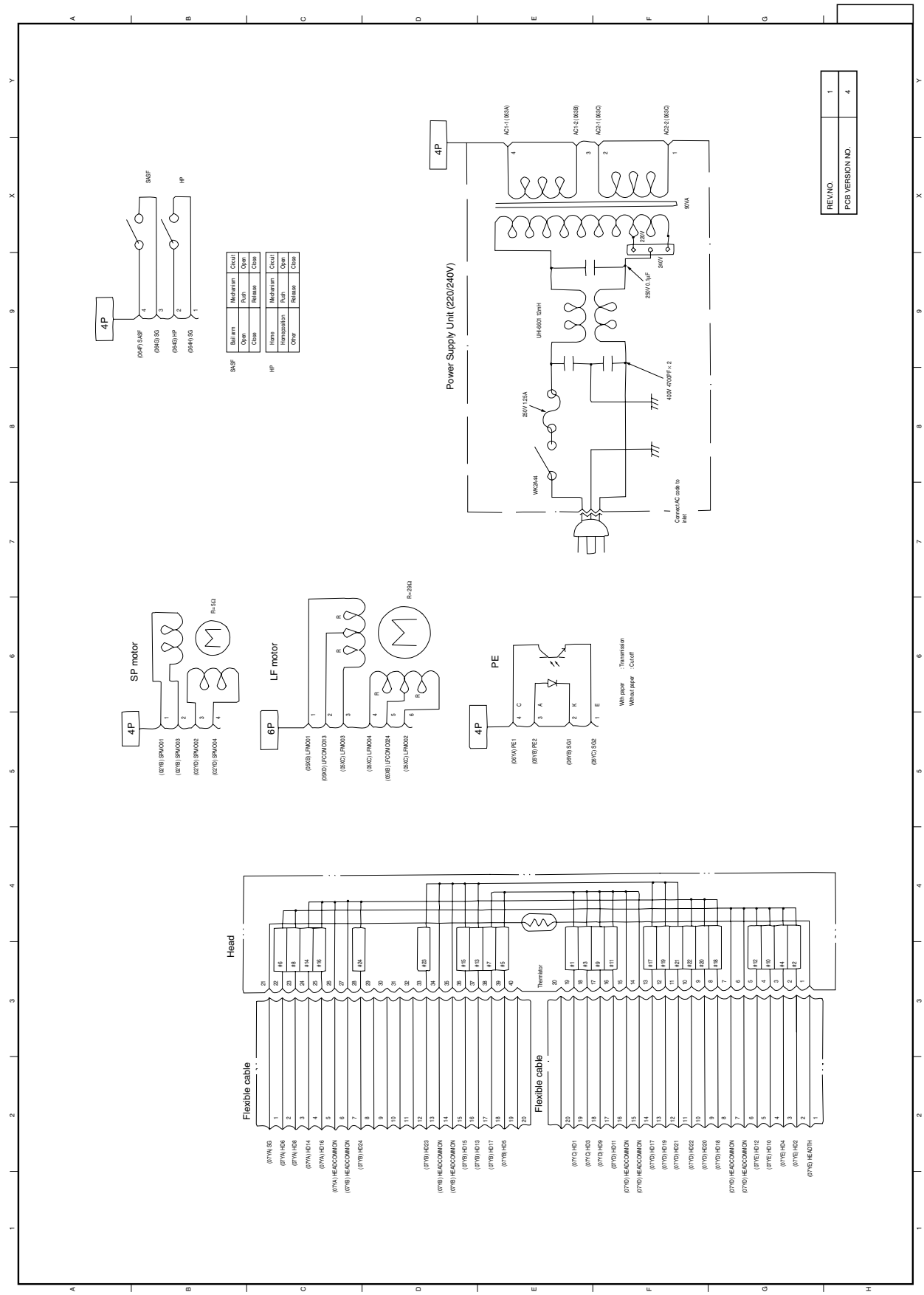


Figure C-1 Circuit Diagram of Main PCB (UMMB) (8/8-1)

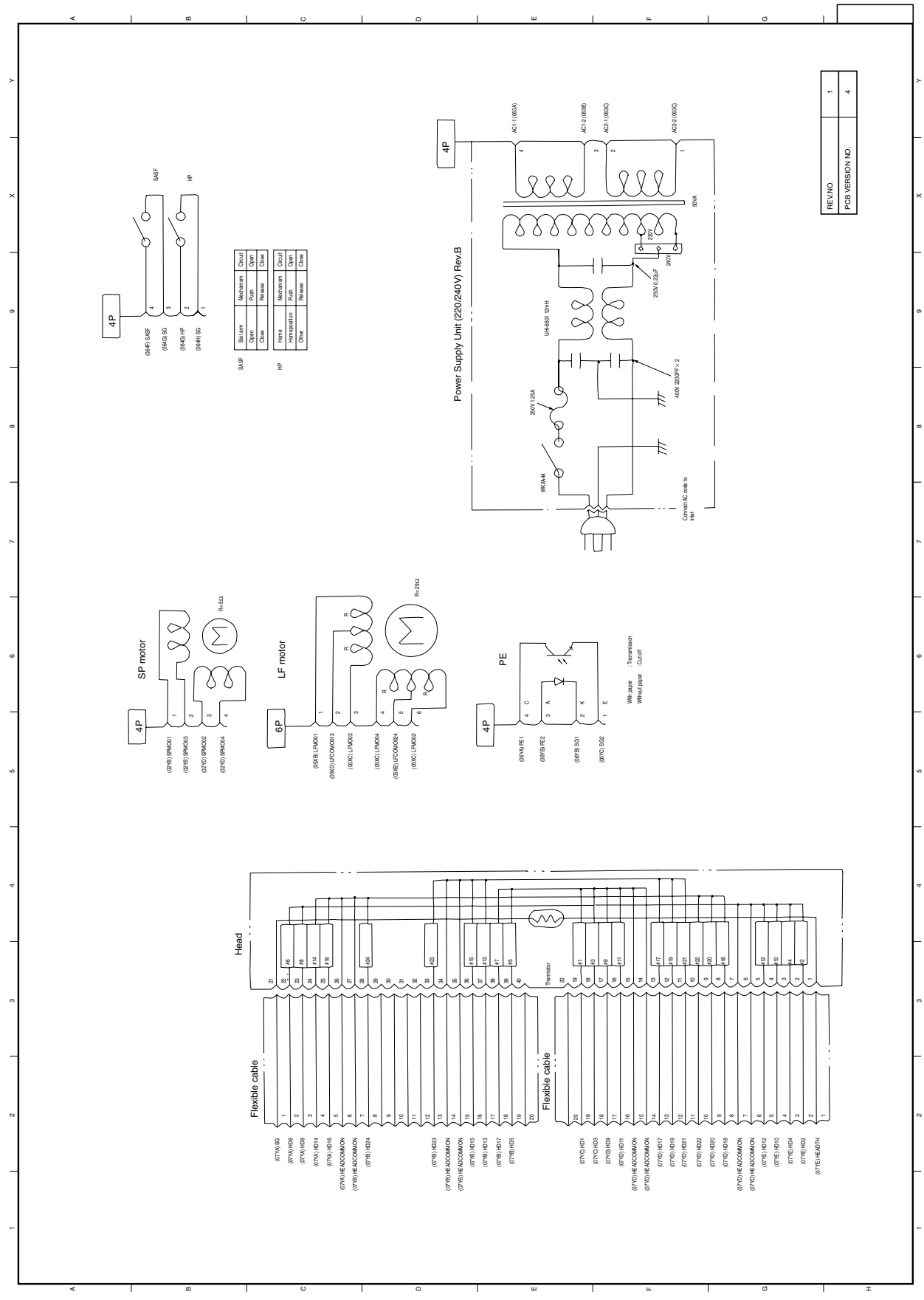


Figure C-1 Circuit Diagram of Main PCB (UMMB) (8/8-2)

APPENDIX D RS-232C (for ML380) SERIAL INTERFACE MODULE

1. GENERAL

This section describes the operation of the RS-232C Serial interface module installed in the Microline 380 as an option using a start-stop synchronization and serial communications circuit. This serial interface board is capable of transmitting and receiving simultaneously at speeds up to 19,200 bits per second. Two protocols are available: printer Ready/Busy and X-ON/X-OFF modes.

Note: As for Serial interface PCB as for the function, 2 kinds of UMRS and UMR exist be same.

The UMR PCB is applied from the order in after, 2003.

2. INSTALLATION PROCEDURE

(1) Knock out the serial panel using the screwdriver.

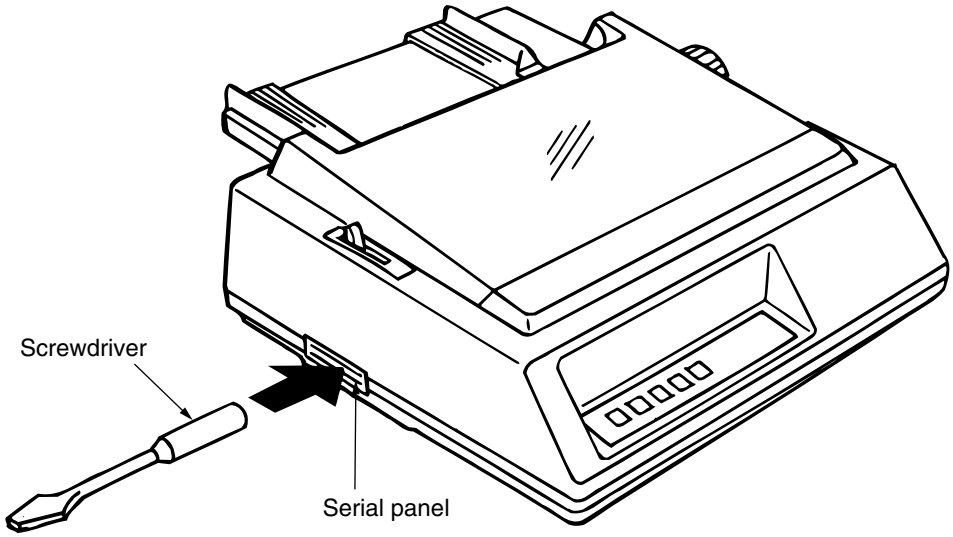
This allows the serial panel to remove from the lower cover and the interface cable outlet to open.

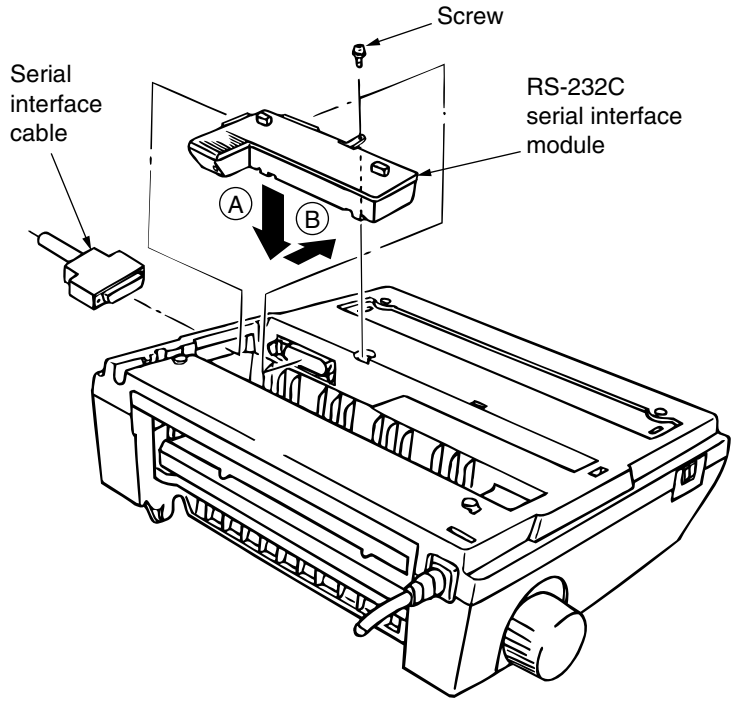
(2) Turn the printer upside down.

(3) Install the serial interface module in the order of Ⓐ and Ⓑ.

(4) Install the screw for FG.

(5) Install the serial interface cable.





3. OPERATION DESCRIPTION

3.1 Element Description

(1) MSMS 80C31

An eight-bit microprocessor controller that controls the following:

(a) Serial interface protocol and data transfer through a serial port

(b) Message buffer

(2) LC9103B-293

(a) Parallel data latch

(b) Transmission of parallel data to the printer

(3) HY0232

An RS232-C standard line driver and receiver

(4) 2764

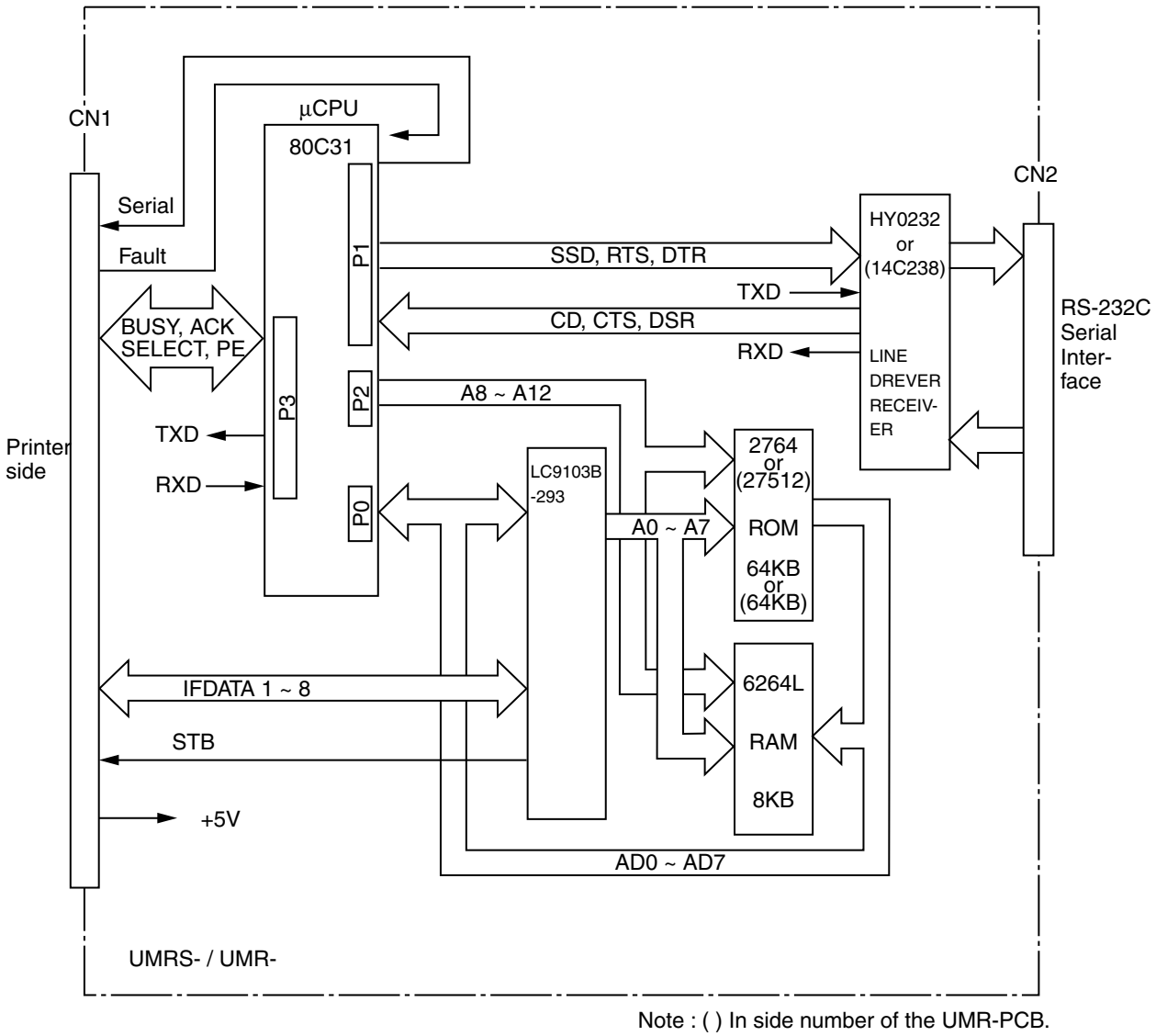
An 8 kbyte ROM that contains the serial interface control program.

(5) HM6264

An 8192-byte static RAM used as a message buffer

3.2 Circuit Description

A block diagram is shown in Figure D-3-1.



Note : ( ) In side number of the UMR-PCB.

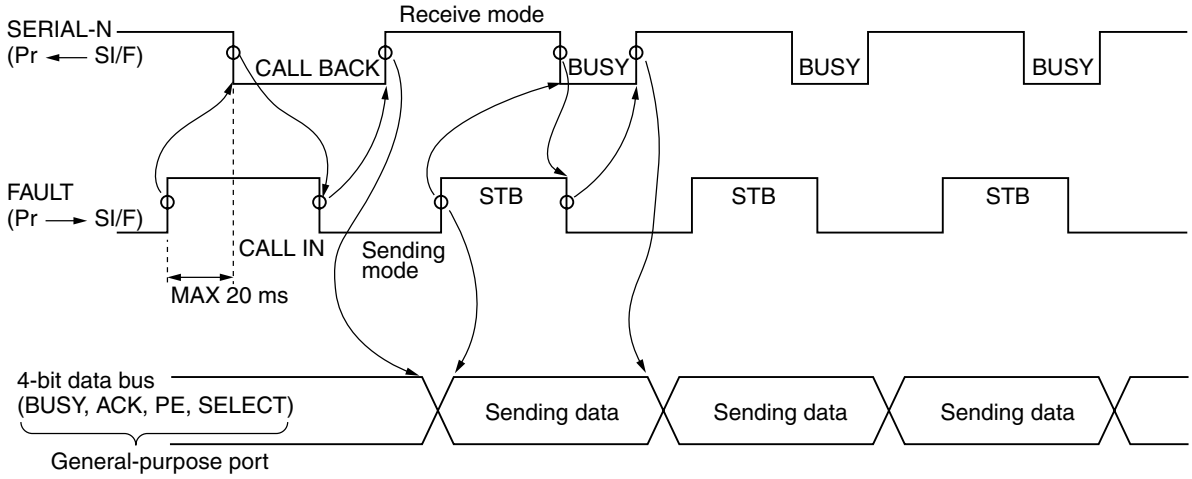
Figure D-3-1 Block diagram

3.2.1 Power-on processing

When the serial interface (I/F) is selected in the MENU, +5V is supplied from the printer to the serial I/F module when the printer is turned on. This allows the CPU and I/F on the serial I/F module to be initialized. (ROM/RAM checking is included.)

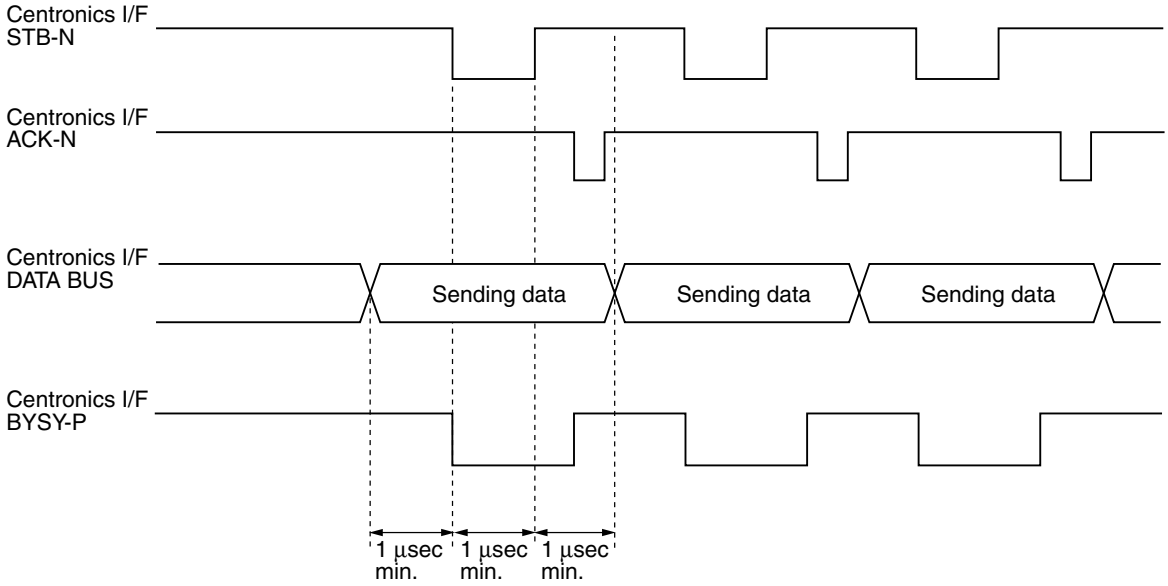
3.2.2 Serial I/F mode setting

After power-on processing, data for serial I/F mode setting is sent from the printer to the serial I/F module through the 4-bit data bus (BUSY, ACK, PE, and SELECT) in synchronization with the FAULT and SERIAL-N signals between the printer and serial I/F module.



3.2.3 Receive parallel data transfer

When the BUSY signal between the printer and serial I/F board is OFF, parallel data translated into serial/ parallel by the CPU is synchronized with the STB-N signal through data buses IFDATA 1-8 and is transferred to the printer.



3.2.4 RS-232C interface

The DTR, SSD, TD and RTS signals output by the 80C31 are converted to RS-232C signals by line receiver/driver HY0232 (Q4) and sent to the interface.

In addition, signals CSR, CTS, CD, and RD on the RS-232C interface are converted to TTL level by line receiver/driver HY0232 (Q4) and input to the 80C31.

3.3 Communication Procedure Flowchart

3.3.1 Mode ⓐ

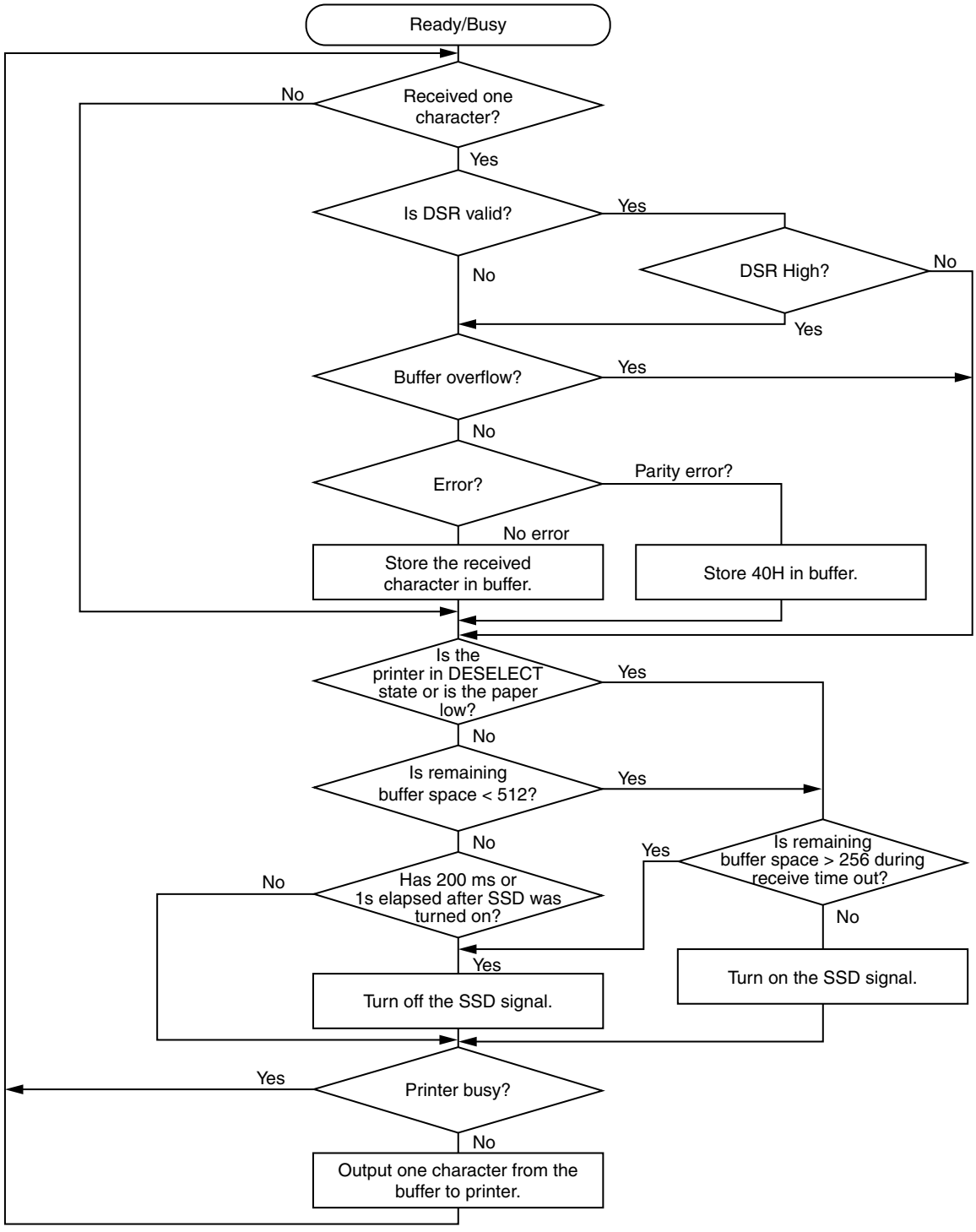


Figure D-3-2

3.3.2 Mode ⓑ

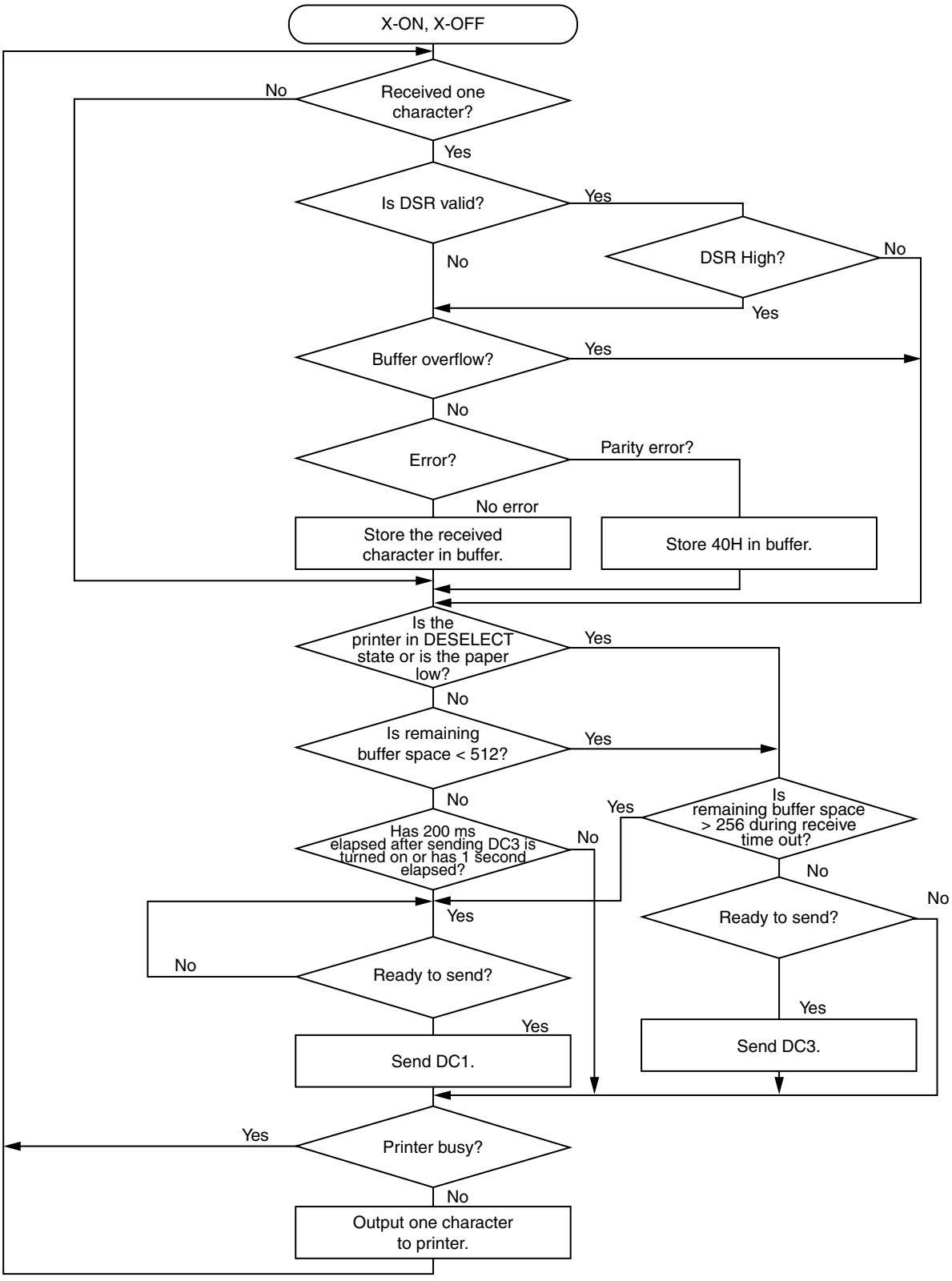


Figure D-3-3

4. TROUBLESHOOTING FLOWCHART

4.1 Before Repairing a Fault

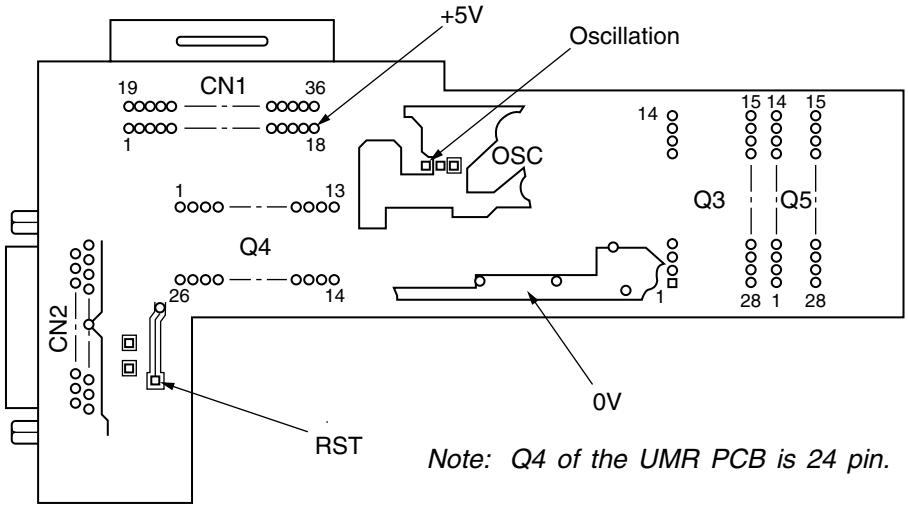
Before servicing the printer, ask the customer in what situation the trouble occurred and record the response.

Before starting troubleshooting, operate the printer in the same situation as that at the time of trouble occurrence to see if the same trouble occurs again. If not, perform the printers self test and thoroughly test the printers functionality. If the trouble is reproducible proceed to the troubleshooting section.

4.2 Troubleshooting

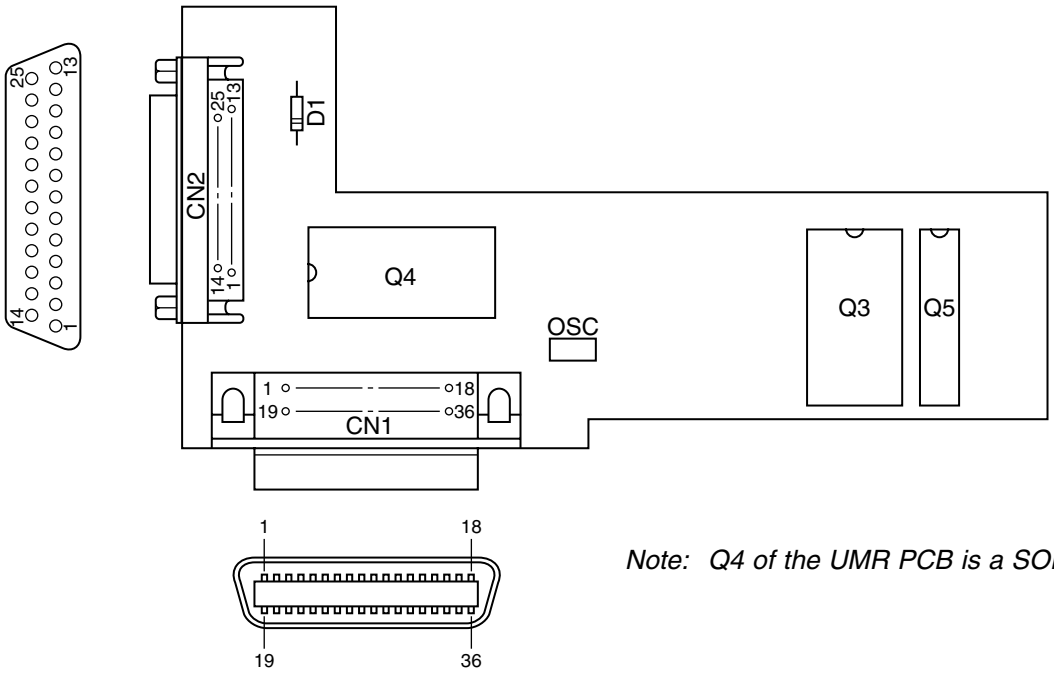
(1) The data is not received using a serial interface.

(2) Using a serial interface, the print data is omitted or the print operation is not performed.



Note: Q4 of the UMR PCB is 24 pin.

UMRS/UMR- solder side diagram



Note: Q4 of the UMR PCB is a SOP type.

UMRS/UMR- component side diagram

① The data is not received using a serial interface.

(A protocol is set to READY/BUSY state, and BUSY LINE is in SSD + state.)

- Is the OSC oscillation waveform as specified in Figure D-4-1?

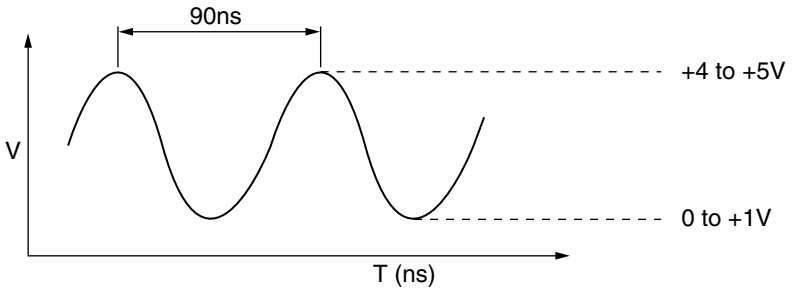


Figure D-4-1

- No Replace the OSC.

Yes Is a RST signal in Q1 as specified in Figure D-4-2?

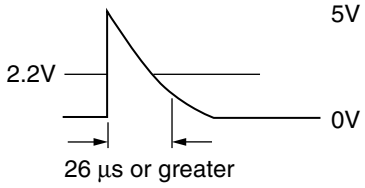


Figure D-4-2

Check the RST circuit on the UMRS(UMR) board.

Ⓐ

- Has the serial interface been selected from the menu of the printer?
  - No Select the serial interface.

Yes Is +5V supplied to pin CN1-18 by the printer?

- No Replace the printer main control board.

YES

Ⓐ

Yes Are ALE, PSEN, RD, WR, and BUS signals as specified in Figure D-4-3?

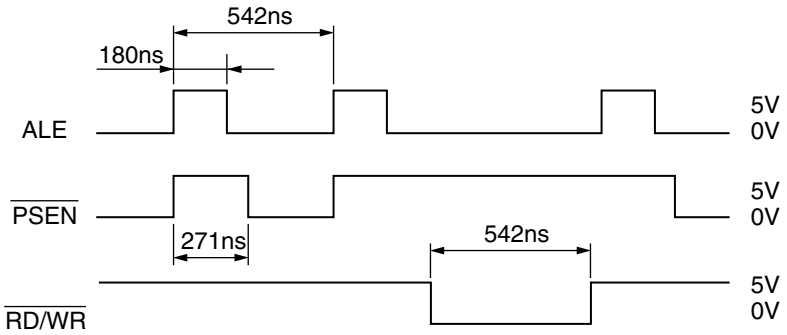


Figure D-4-3

- No Replace the Q1.

Yes Is CN1-11 pin (BUSY) signals low level?

- No Check the printer.

Yes Are +9V and -9V output to Q4-14 pin and 16 pin? (Case of UMR-PCB : Q4-11 pin and 15 pin?)

- No Replace the Q4.

Yes Is pin 20 SSD signal of Q4 high level? (Case of URM-PCB : Q4-18 pin check)

- No Replace the Q1.

Yes Is pin 8 SSD of Q4 low level? (Case of UMR-PCB : Q4-1 pin check)

- No Replace the Q4 or the CN1.

Yes Is pin 4 RxD of Q4 as Specified in Figure E-4-4? (Case of UMR-PCB : Q4-7 pin check)

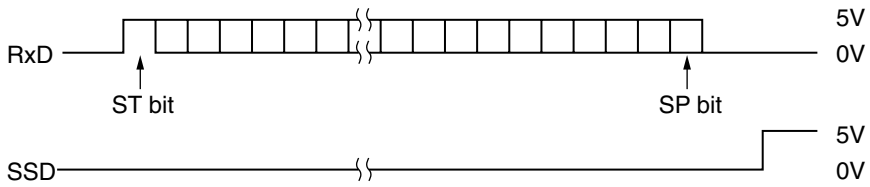


Figure D-4-4

- No Replace the Q4.

Yes Replace the Q1 or Q2.

② When receiving data with serial interface, printing data is omitted or printing operation is not performed.

- Are RxD and SSD of Q4 as specified in Figure D-4-4?
  - No Replace the Q4.
- Yes Are 1 pin STB and BUS signals of CN1 as specified in Figure D-4-5?

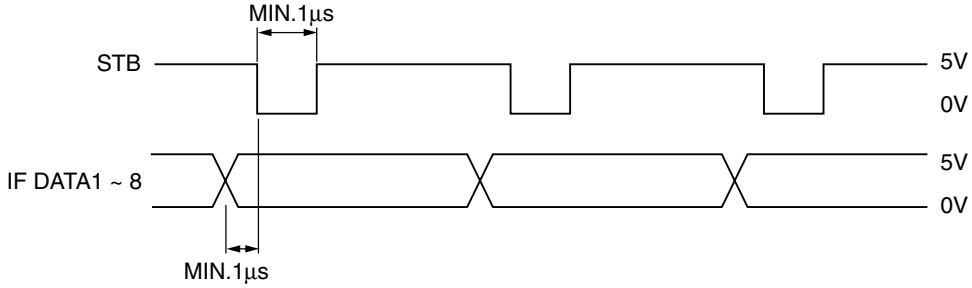


Figure D-4-5

  - No Replace the Q2.
- Yes Replace UMRS board.

4.3 Local Test

4.3.1 Circuit test mode

1) Setting

(a) Diagnostic test (select “YES” in menu).

(b) Test connector

Connect the test connector shown in Figure D-4-6 to the interface connector.

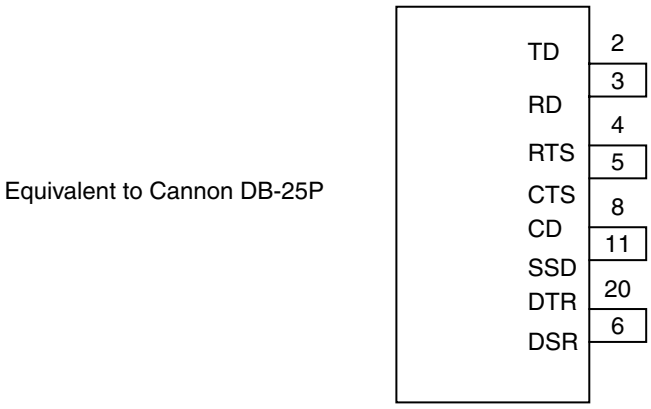


Figure D-4-6 Test connector connection diagram

2) Function

After the settings outlined in Section 1) are completed and power is turned on, the serial interface checks the message buffer memory and interface drive /receiver circuit. It then prints characters.

To start and stop this test, push the SLELCT switch on the front of the printer.

Details of this test are explained as follows.

(a) The program revision using two numerical characters is printed.

(b) “SREAL I/F F/W 01.00” , “LOOP TEST” is printed.

(c) Memory is checked for the message buffer.

(d) “RAM = OK” is printed if the memory check is OK and “RAM = BAD” is printed if the memory check fails.

(e) Output level to DTR, RTS, and SSD signals is dropped low. If DSR, CTS, or CD signals is High, “I/F = BAT” is printed. If DSR, CTS, and CD signals are all low, “I/F = OK” is printed.

(f) Output level to DTR, RTS, and SSD signals is raised high. If DSR, CTS, or CD signals is Low, “I/F = BAD” is printed. If DSR, CTS, and CD signals are all High, “I/F = OK” is printed.

(g) Characters codes from 20H to 7FH are transmitted by SD signal. At the same time characters are received by the RD signal and stored in the message buffer.

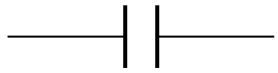
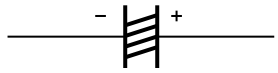
(h) The characters that were stored in the message buffer as indicated in (g) are printed.

(i) Steps (a) through (h) are repeated until test is interrupted.

5. CIRCUIT SYMBOLS AND CIRCUIT DIAGRAMS

Table D-5-1 lists the circuit symbols used in the super-speed RS-232C interface circuit diagram, and Figure D-5-1 shows the circuit diagram.

Table D-5-1 Table of symbols

Symbol	Mark	Description
	OSC	Oscillator
	D	Diode
	C	Capacitor
	C	Electrolytic capacitor
	R	Resistor
	S	Jumper wire

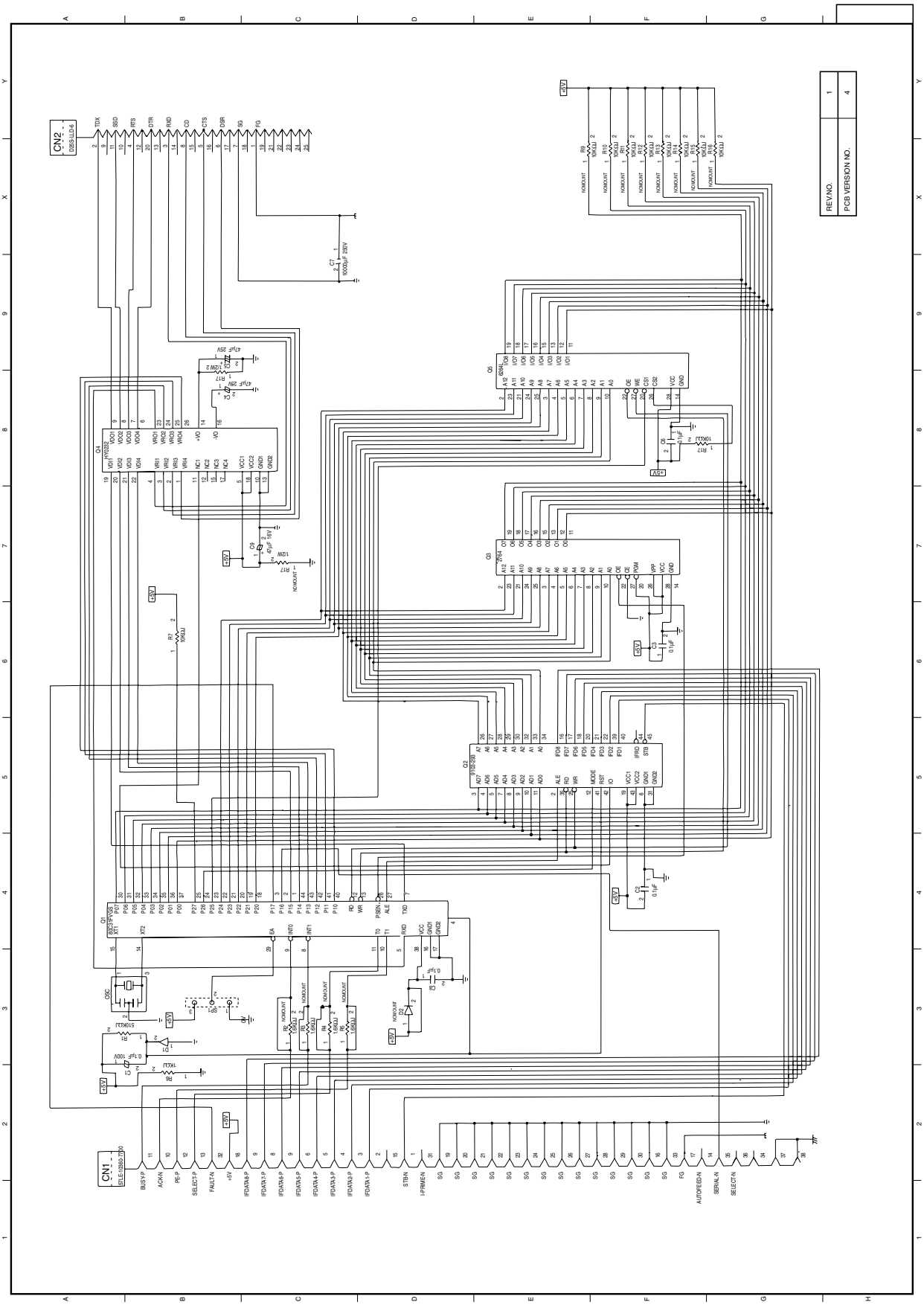


Figure D-5-1 RS-232C I/F Circuit Diagram (1/2)

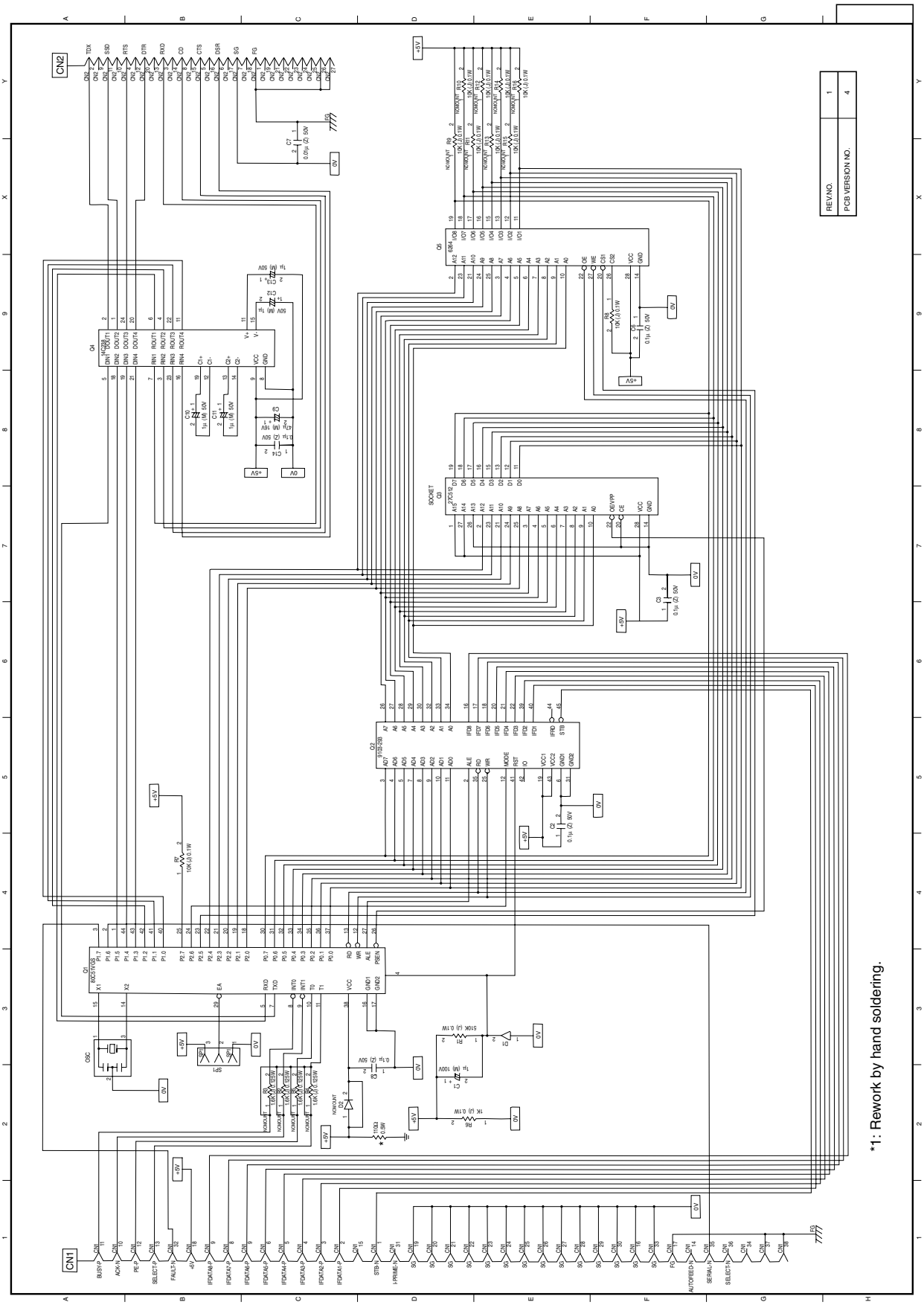


Figure D-5-1 RS-232C I/F Circuit Diagram (2/2)